VILLAGE OF HAMILTON

NATURAL GAS CONSTRUCTION STANDARDS

VILLAGE OF HAMILTON

This manual has been reviewed and approved by:

_____ _____
Sean Graham **Date**
Village Administrator

_____ _____
John Basher **Date**
President
Municipal Utility Commission

Table of Contents

26.00	Pipeline Test Requirements	0	
27.00	Purging Mains and Services	0	
28.00	Casings	0	
29.00	Terminal Gauge and Remote RTU Installations	0	
30.00	Meters-General	0	
31.00	Residential Meter Sets	0	
32.00	Fixed Factor Meter Measurement	0	
33.00	Commercial and Industrial Measurement	0	
34.00	Corrosion	0	
35.00	Corrosion Coatings	0	
36.00	Coating Inspection	0	
37.00	Corrosion Test Station Installations	0	
38.00	Conversion Factors	0	
39.00	Sizing Tables	0	
40.00	Standard Pipe Data	0	
41.00	Contractor Inspection Guide	0	

SECTION 1.00 SCOPE

1.1 SCOPE

This Gas Construction Standards Manual has been developed in accordance with gas industry standards, state and federal laws, codes and regulations. It is intended to act as a standard in the engineering and construction of gas facilities for the Village of Hamilton.

These standards were developed to satisfy the minimum requirements for the construction of natural gas distribution and transmission facilities.

SECTION 2.00 CODES / PIPE DESIGN

- Codes
- References
- Steel Pipe Design
- References
- Design Formula
- Calculations
- Plastic Pipe Design
- References
- Calculations

1.1 CODES

1.2 The following list of codes was used as reference to develop the Gas Construction Standards Manual. A brief description of each is included.

2.1 REFERENCES

2.2 Title 16 New York Code, Rules and Regulation (NYCRR)
(Part 255 referring to the transmission and distribution of gas)
This is the New York State minimum standard that governs the design, construction, operation and maintenance of natural gas transmission and distribution facilities in New York State.
Title 16 NYCRR Part 255 meets or exceeds the requirements contained in Federal Code 192 and reflects practices contained in the ASME Guide for Gas Transmission and Distribution (ANSI Code B 31.8), both are described below.

Other parts of this regulation that govern the gas business are:

Part 131 - Utilities Within State Highway Limits
Part 226 – Gas Meters and Accessories, Testing and Reporting
Part 232 - Interruption of Service
Part 261 - Piping Downstream of the Meter

2.3 D.O.T. Part 192 (Transportation of Natural Gas and Other By Pipeline; Minimum Federal Safety Standards)

These are the federal regulations administrated by the U.S.D.O.T.'s Pipeline and Hazardous Material Safety Administration (PHMSA). This code is administered by the Office of Pipeline Safety Operations. This code sets minimum standards for materials, design, welding, joining of materials other than by welding, construction requirements, meters, regulators, lines, test requirements, uprating, operations and maintenance procedures.

2.4 ASME Guide for Gas Transmission and Distribution (ANSI Code B 31.8)

This Guide includes the Federal Gas Pipeline Safety Standards, together with the design recommendations, material reference and recommended practices of the ASME Gas Piping Standards Committee. The function of the Committee's "Guide" material is to provide "how to" supplementary recommendations related to the Federal Safety Standards.

This Guide was formerly the ANSI B31.8 Code.

2.5 D.O.T. Part 191 (Transportation of Natural Gas and Other By Pipeline; Annual Reports, Incident Reports, and Safety Related Condition Reports)

These are the federal regulations administrated by the U.S.D.O.T.'s Pipeline and Hazardous Material Safety Administration (PHMSA). This code is administered by the Office of Pipeline Safety Operations. This code prescribes requirements for the reporting of incidents, safety related conditions, and annual pipeline summary data by operators of gas pipeline facilities.

2.6 AGA Purging Principles and Practices

This is a guide consisting of background information and descriptions of various methods and procedures found by experienced operators to be effective in minimizing or controlling combustible mixtures and maintaining safe atmospheres inside pipes, holders, tanks and other facilities being placed in service or taken out of service.

2.7 AGA Plastic Pipe Manual

This is a collection of information, data, specifications, and recommendations on the use of plastic pipe for the distribution of natural gas. It is intended to be a prime reference source on the subject of the plastic piping.

2.8 New York State Department of Education Regulations (Manual of Planning Standards)

Gas installations made on public school property, colleges and universities must be in compliance with the New York State Department of Education Regulations.

2.9 Codes and Regulations of the State New York, (NYCRR) Public Safety Title 16, Part 753 , which are the procedures for the protection of underground facilities required by the General Business Law Article 36 and Public Service Law Section 119-b.

2.10 Fuel Gas Code of New York State-NYS Department of State Division of Code Enforcement and Administration

This code offers general criteria for the installation and operation of gas piping and gas equipment on consumers' premises.

2.11 National Electric Safety Code

This code covers supply and communication lines, equipment, and associated work practices employed by a utility in the delivery of electricity from the point of generation or purchase to the point of delivery to the customer's facilities.

2.12 National Electric Code

This code offers general criteria for the installation of electric wiring and electric equipment on consumer's premises.

2.13 Code of Federal Regulations - 29 (OSHA)

This section of the code includes parts 1900-1910, or the Occupational Health and Safety Administration (OSHA). OSHA Regulations cover many safety concerns relating to personnel and their work environment.

2.14 National Fire Prevention Association

#54 - included in National Fuel Gas code
#54A - standard for the installation of gas piping and gas equipment on industrial premises and certain other premises.

2.15 C.P. Chem., Performance Pipe, Piping Publication April 2002.

2.16 Village of Hamilton Natural Gas Operating and Maintenance Procedures Manual

2.17 American Society for Testing and Materials (ASTM) F1962-99, Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene pipe or Conduit Under Obstacles, Including River Crossings.

2.18 Trenchless Technology Technical Note No. 1, Plexco, Chevron, Horizontal Directional Drilling (Guided Boring) with Plexco Pipe, revision 1.

2.19 North American Society for Trenchless Technology (NASTT), First Edition, September 1995, Mini-Horizontal Directional Drilling Manual

3.1 STEEL PIPE DESIGN

3.2 This specification describes the design of steel pipe (bare and coated) for aboveground and underground use. Included in this specification is the design formula and calculation.

4.1 REFERENCES

4.2 Code of Federal Regulations, Transportation Title 49, Part 192

4.3 Codes, Rules and Regulations of the State of New York (NYCRR), Public Safety Title 16, Part 255.101 to 255.115

4.4 American Society of Mechanical Engineering (ASME), Gas Transmission and Distribution Piping Systems, ASME B31.8 - 1999 Edition, section 841 Steel Pipe.

5.1 DESIGN FORMULA

5.2 The maximum allowed operating pressure for steel pipelines is determined by using the following formula.

$$P= (2St/D) \times F \times E \times T$$

Where:

P = Design pressure in pounds per square inch gauge (psig).

S = Yield strength in pounds per square inch.

D = Nominal outside diameter of the pipe in inches.

t = Nominal wall thickness of pipe in inches.

F = Design factor; as specified in 16 NYCRR Part 255 for steel pipe.

E = Longitudinal joint factor; as specified in 16 NYCRR Part 255 for seamless or electric resistance welded steel pipe manufactured under API specification 5L the longitudinal joint factor is: E = 1.00

T = Temperature derating factor; as specified in 16 NYCRR Part 255 for steel pipe that operates at a gas temperature of 250 degrees Fahrenheit or less, the temperature derating factor is: T = 1.00

6.1 CALCULATIONS

6.2 All Village operated steel pipelines are designed to a Class 3 location. Actual Gate Station site is a Class 1 location based on building density.

6.2.1 In a class 3 location the design Factor is: F = 0.50.

6.3 The design formula must be used to determine what percent of SMYS the proposed pipeline will operate.

6.4 Application of design formula to 2” Village of Hamilton station piping:

P = (2st/D) X F X E X T

Where:

F= Design Factor = 0.5 for Class 3
E = 1.0
T = 1.0
s = 52,000 psi
P = 4773 psi
t = .218”
D = 2.375”

SMYS = 1440/4773 = 30%, since it exceeds 20% therefore it’s classified as transmission piping per NYCRR Title 16 Part 255.

7.1 PLASTIC PIPE DESIGN

7.2 REFERENCES

Code of Federal Regulations, Transportation Title 49, Part 192.

Codes, Rules and Regulations of the State of New York (NYCRR), Public Safety Title 16, Part 255.121 and 255.123

American Society of Mechanical Engineering (ASME), Gas Transmission and Distribution Piping Systems, ASME B31.8 - 1999 Edition, section 841 Steel Pipe.

Plastic Pipe Institute, Handbook of PE Pipe, Chapter 6, Design of Polyethylene Piping Systems.

7.3 CALCULATIONS

The maximum allowable operating pressure of plastic pipe is determined in accordance with the following formula.

$$P = \frac{2St \times DF}{(SDR - 1)}$$

Where:

P = Design Pressure, PSIG
S = the long term hydrostatic strength, 11,000 psig)
t = Specified wall thickness, inches
SDR = Standard Dimension Ratio, the ratio of the average outside diameter to the minimum specified wall thickness
DF= .32 = Environmental Design Factor
= .40 = Nominal pipe size (IPS or CTS) 4 inch or less, SDR 11 or greater (i.e. thicker pipe wall), PA-11 pipe produced after January 23, 2009.

7.4 Note: All plastic distribution pipe for the Village of Hamilton system will utilize HDPE pipe 3408/3608 or 4710 SDR 11 except for ½" which will be SDR 7 at a maximum operating pressure of 100psi.

SECTION 3.00 NOTIFICATIONS

- References
- PSC
- Excavation
- Highway
- Special
- Rights Of Way
- Miscellaneous

1.1 NOTIFICATIONS

1.2 This section pertains to notifications required before construction activity is undertaken.

2.1 REFERENCES

2.2 NYCRR, Public Safety Title 16, Part 255.4, 255.302, 255.505, 255.552

2.3 NYCRR, Public Safety Title 16, Part 753.

2.4 NYSDOT Part 131.

3.1 CONSTRUCTION RELATED PSC NOTIFICATION

3.2 The Village must notify the PSC of the intent to perform construction on the gas system for several situations.

3.3 **At least 30 days prior to** the start of construction or reconstruction of any main designed to operate at 125 psig or more, the Village is required to file with the Albany office of the New York State Public Service Commission (PSC) a letter of intent and a report of specifications.
Note: If there is no response from the PSC within 30 days, the project may proceed.

3.4 The intent to pressure test a pipeline designed to operate at greater than 125 psig must be reported to the Albany office of the PSC at least 5 business days prior to the start of the test.
Note: Testing will not be considered satisfactory unless certified by an inspector from the Gas division of the PSC. Part 255.505 (h), (i) 3.1.3

3.5 According to 16 NYCRR Part 255.302(b), before any pipeline designed to operate at or above 125 psig is put into operation, a report shall be filed with the Albany Office of the PSC certifying the Maximum Operating pressure to which the line is intended to be subjected and also certifying that the line has been constructed and tested according to the requirements stated in part 255. This report will include copies of all the tests required by these rules.

3.6 The Maximum Allowable Operating Pressure (MAOP) of systems at or above 125 psig cannot be raised or lowered without submitting a letter of intent to the Albany office of the PSC **at least 60 days prior** to the proposed change of the said certified pressure according to NYCRR Part 255.552(a). This requirement is also in effect for pressure increases above 125 psig in pipelines designed to operate at less than 125 psig. Pressure increases in pipelines operating at or above 125 psig must be explained in writing to the Albany office of the PSC. A public hearing may also be required according to NYCRR Part 255.552(b).

3.7 The MAOP of systems operating below 125 psig cannot be raised without a letter of intent to the Albany office of the PSC **at least 60 days prior** to the proposed change of the said certified pressure according to NYCRR Part 255.552(c) for the following situations.

1. Any system operating between 1/2 and 60 PSIG and the final difference is greater than 6 psig.
2. Any system operating between 60 and 124 psig and the final difference is greater than 10% of the new MAOP.
3. Any system being converted from low pressure to any pressure less than 124 psig.

Note: In the event of an emergency, verbal permission may be obtained but written notification must be filed promptly.

3.8 Unless otherwise indicated all submissions to the New York State Public Service Commission, written or telephonic, should be directed to:

Department of Public Service

Gas and Water Division

3 Empire State Plaza

Albany, New York 12223-1350

(518) 474-5453

4.1 CONSTRUCTION RELATED EXCAVATION NOTIFICATION

4.2 The Village construction departments are required to contact the central one call notification system Dig Safely New York for the protection of underground facilities prior to undertaking excavation work.

4.3 Dig Safely New York **(one call system)** must be notified at least **two working days but not more than 10 working days** before construction begins.
The Dig Safely New York number for New York State (Outside of New York City and Long Island) is: 1- 800- 962-7962.
In the event of a gas emergency requiring excavation, Dig Safe New York shall be notified as soon as possible that the excavation is commencing or is underway.

5.1 HIGHWAY PERMITS

5.2 Whenever planning to dig within the established highway limits, a highway permit must be obtained from the local, county, state or governing authority that has jurisdiction over the road.
In the event of an emergency, the permit can be obtained by contacting the proper authority as soon as practicable during business hours.
An annual permit is obtained from the state on a regional basis for common O&M procedures. A copy of this permit must be available on all construction trucks.

6.1 SPECIAL PERMITS

6.2 Special permits must be obtained from the governing authorities when it is necessary to cross-navigable waterways, canals, railroads or designated wetlands.

7.1 RIGHTS OF WAY

7.2 Rights of Way are required when main is installed on private property or when portions of a gas service cross-lands other than the customers.

7.3 Main - Right of way or an easement is required for all main that is located on **private** property.

7.4 Services - Right of way or an easement is only required for a service line if the line or part of it crosses **private** property that does not belong to the customer. An easement would then be required for that portion of the service that was not on the customers property.

8.1 MISCELLANEOUS

8.2 General notifications should be made to our customers prior to commencing construction and maintenance activity that may interrupt the customer's normal

schedule or cause undue hardship or delay.

8.3 Long Side Service – a Village Representative shall contact the customer on the opposite side of the road where the gas main is located.

8.4 Survey Permission – Prior to fieldwork beginning for the layout of system replacements or extensions on private property survey permission shall be obtained from the property owner.

8.5 Emergencies – The Gas Supervisor shall attempt to contact the customer or landowner prior to starting any work if possible.

8.6 Inside – If work performed involves any part of the customer's service pipe, regulator, meter, fuel lines, or appliances, then a check of all appliances must be made after the work is completed. The check is to be sure that pilots have not been affected on any of the appliances. If it is not possible to enter the building to make such a check, the service will be shut off or isolated until arrangements can be made to enter the premises.

SECTION 4.00 MAINS GENERAL

- Installation Requirements
- References
- Description Of Distribution Mains
- Description of Transmission Mains
- Backfill – General
- Bedding/Padding Of Trench
- Backfill Of Trench
- Cover Distribution Mains
- Clearances Distribution Mains
- Cover Mains Operating Above 124 PSIG
- Clearances Mains Operating Above 124PSIG

1.1 INSTALLATION REQUIREMENTS

1.2 This section provides a brief description and an overview of general pipe joining, and installation clearance requirements for Distribution and Transmission Mains.

2.1 REFERENCES

2.2 NYCRR, Public Safety Title 16, Part 255 various sections

2.3 American Society of Mechanical Engineering (ASME), Gas Transmission and Distribution Piping Systems, ASME B31.8 - 1995 Edition.

2.4 Department of Transportation (DOT), Part 192, 49 CFR.

3.1 DESCRIPTION OF DISTRIBUTION MAINS

3.2 Distribution Mains (0 – 124 PSIG) - may be constructed of (coated and wrapped steel for underground use or bare for above ground use) API 5L Grade B pipe or plastic HDPE 3408/3608 or 4710.

3.2.1 The joints may be welded or in the case of plastic pipe, using heat fusion, mechanical or compression type couplings.

4.1 DESCRIPTION OF TRANSMISSION MAINS

4.2 Transmission Mains (125 PSIG & ABOVE) - may be constructed of (coated and wrapped steel for underground use or bare for above ground use) API 5L Grade B or stronger pipe with welded joints.

4.3 All transmission lines are to be constructed to a minimum of Class 3 construction (high pressure distribution as defined in part 255 will be referred to as transmission).

5.1 BACKFILL - GENERAL

5.2 Backfill operations should follow placement operations as close as practicable so a minimum amount of ditch is open at any time.

5.3 Backfilling shall be completed in a manner sufficient to prevent soil settlement at

a later date. Trenches in any roadway or driveway using loose backfill material shall be backfilled and mechanically tamped in 12 inch lifts until the trench is filled.

5.4 The authority having jurisdiction over any trench, shall also approve backfill material, the number compaction lifts, and surface restoration method.

5.5 Prior to installing the pipe into the ditch, the ditch shall be inspected to insure that it is free of any material that would damage the pipe or coating during the backfill process.

6.1 BEDDING/PADDING OF TRENCH

6.2 The bedding refers to the layer of backfill material the pipe lays on. This layer is installed in the trench bottom and is a minimum of 3 inches deep.

6.3 The padding refers to the area of the trench from the pipe to 6 inches above the pipe.

6.4 Refer to the trench detail drawing in this section for reference (page 21).

6.5 For plastic or steel installations, the bedding shall be used to provide firm uniform support along the entire length of the pipe compacted to eliminate voids and to avoid possible shear points.

6.6 Topsoil or organic material shall not be used for bedding or padding around the pipe due to settlement of ditch line and gasses releases. As the organic material decomposes it can produce false indications of leakage when using a Flame Ionization (FI) unit or the Combustible Gas Indicator (CGI).

6.7 Rock or frozen materials shall not be placed directly adjacent to the pipe or padding layer.

6.8 Native spoil may be utilized as bedding/padding only if the particle size is no greater than 2 inch and the particles are smooth, rounded, and non-angular.

6.9 When the native spoil is not suitable for bedding/padding, suitable backfill or sand padding shall be hauled in and used. Rockshield may also be an alternative if it is uneconomical to haul in backfill material.

7.1 BACKFILL OF TRENCH

7.2 The backfill layer refers to the area of the trench above the bedding/padding layer to within 2 inches of final grade.

7.3 Refer to the trench detail drawing in this section for reference (page 23).

7.4 Backfill may contain rocks up to approximately 6 inches in diameter for areas maintained as mowed turf, and up to approximately 12 inches for all other areas unless specified. Frozen lumps of soil shall be broken up and pulverized prior to backfilling.

8.1 COVER DISTRIBUTION MAINS

8.2 All distribution mains shall be installed with a minimum of 24 inches of cover unless specified differently on specific job plans or as noted below.

8.3 If an underground structure prevents installation with the minimum cover, the main may be installed at a lesser depth provided it is adequately protected from anticipated external loads.

8.4 Mains installed in agricultural areas cultivated for at least two of the past five years shall have a minimum cover of 48 inches.

8.5 Mains installed in a navigable river, stream or harbor must have a minimum cover of 48 inches in soil or minimum 24 inches in consolidated rock. If an underground structure prevents said cover, the main may be installed at a lesser depth provided it is adequately protected from anticipated external loads.

9.1 CLEARANCES DISTRIBUTION MAINS

9.2 Distribution Mains shall be installed with a minimum of 6 inches of clearance from any underground structure when possible.

9.3 If this clearance **cannot** be attained, a minimum clearance of 2 inches is permissible providing the main is suitably protected from damage that might result from the proximity of the other structure.

10.1 COVER MAINS OPERATING AT OR ABOVE 125 PSIG

10.2 Shall be installed with a minimum cover as follows, unless specified differently on specific job plans or as noted below.

Location	Normal Soil	Consolidated Rock
Class 1 Locations	30 inches	18 inches
Class 2, 3 and 4 Locations	36 inches	24 inches
Drainage ditches of public roads and railroad crossings	36 inches	24 inches

10.3 The following exceptions apply:

10.4 When an underground structure prevents the installation with minimum cover, the main may be installed at a lesser depth with adequate protection from anticipated external loads.

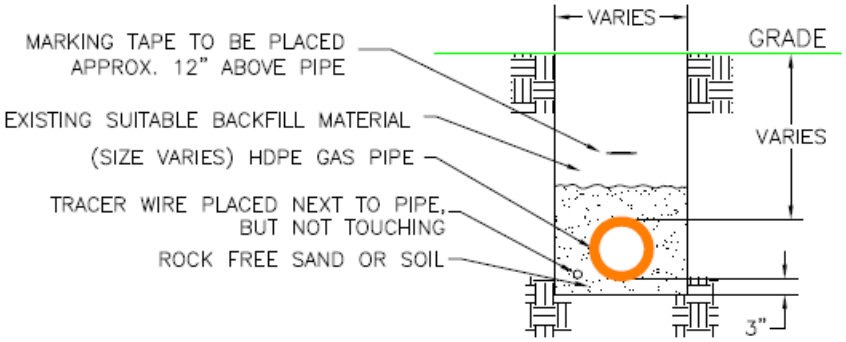
10.5 Mains installed in agricultural areas cultivated for at least two of the past five years shall have a minimum cover of 48 inches.

10.6 Mains installed in a navigable river, stream or harbor must have minimum cover of 48 inches in soil or 24 inches in consolidated rock. If an underground structure prevents the installation with minimum cover, a lesser depth will be permitted provided adequate protection from anticipated external loads.

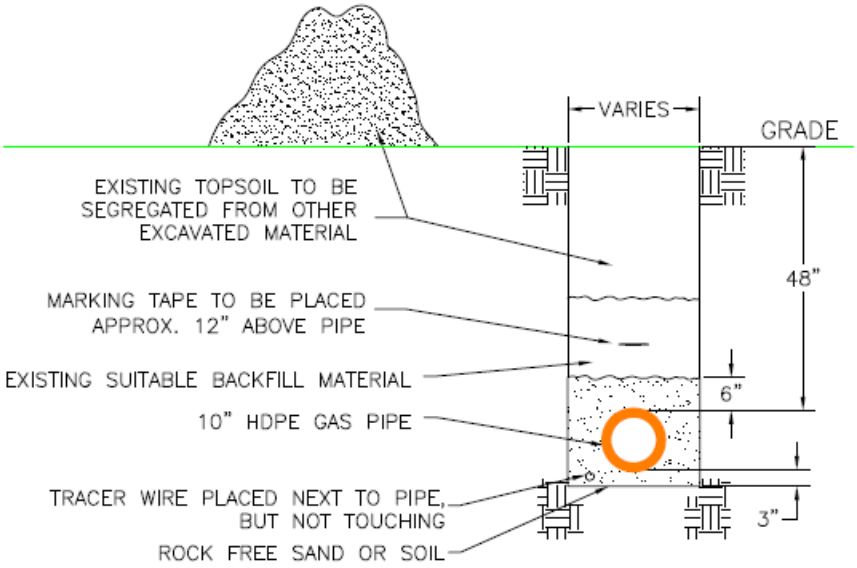
11.1 CLEARANCES MAINS OPERATING AT OR ABOVE 125 PSIG

11.2 Shall be installed with a minimum of 12 inches of clearance from any underground structure not associated with the main. If this clearance cannot be attained, a minimum clearance of 2 inches is permissible, provided the main is **suitably protected** from damage that may result from the proximity of the other structure.

11.3 Suitably Protected - includes but is not limited to at least 1/2 inch of non-conducting permanent material, such as a section of fiberglass shield.



GAS TRENCH DETAIL



TYPICAL GAS TRENCH DETAIL
AGRICULTURAL AREAS

SECTION 5.00 SERVICES GENERAL

- Installation Requirements
- References
- Definition Of A Service
- Materials
- Backfill – General
- Bedding/Padding Layer Of Trench
- Backfill Layer Of Trench
- Cover Services
- Clearances Services
- Prohibited Installations
- Installation Considerations
- Excess Flow Device

1.1 INSTALLATION REQUIREMENTS

1.2 This section provides a brief description and an overview of general requirements for the installation of Gas Services.

2.1 REFERENCES

2.2 NYCRR, Public Safety Title 16, Part 255 various sections

2.3 American Society of Mechanical Engineering (ASME), Gas Transmission and Distribution Piping Systems, ASME B31.8 - 1999 Edition.

2.4 Department of Transportation (DOT), Part 192, 49 CFR.

3.1 DEFINITION OF A SERVICE

3.2 Service is defined as the pipe between the main and the meter bar. A gas service may serve 2 separate dwellings before it is considered a gas main.

4.1 MATERIALS

4.1.1 All gas services on mains operating from 0 psig to 124 psig shall be constructed using High Density PE 3408/3608 or 4710.

4.2 The joints may be made using heat fusion, mechanical and compression type couplings.

5.1 BACKFILL - GENERAL

5.2 Backfill operations should follow placement operations as close as practicable so a minimum amount of ditch is open at any time.

5.3 Backfilling shall be completed in a manner sufficient to prevent soil settlement at a later date. Trenches in any roadway or driveway using loose backfill material shall be backfilled and mechanically tamped in 12 inch lifts until the trench is filled.

5.4 The authority having jurisdiction over any trench, shall also approve backfill material, the number compaction lifts, and surface restoration method.

5.5 Prior to installing the pipe into the ditch, the ditch shall be inspected to insure that it is free of any material that would damage the pipe or coating during the backfill process.

6.1 BEDDING/PADDING LAYER OF TRENCH

6.2 The bedding refers to the layer of backfill material the pipe lays on. This layer is installed in the trench bottom and is 3 inches deep.

6.3 The padding refers to the area of the trench from the pipe to 6 inches above the pipe.

6.4 For plastic installations, the bedding shall be used to provide firm uniform support along the entire length of the pipe.

6.5 Topsoil or organic material shall not be used for bedding or padding around the pipe due to settlement of ditch line and gasses released as the organic material deteriorates can produce false indications leakage using the Flame Ionization (FI) unit or the Combustible Gas Indicator (CGI).

6.7 Rock or frozen materials shall not be placed directly adjacent to the pipe or padding layer.

6.8 Native spoil may be utilized as bedding/padding only if the particle size is no greater than 2 inch particles that are smooth, rounded, and non-angular.

6.9 When the native spoil is not suitable for bedding/padding material, suitable backfill or sand padding may be hauled in and used. Rockshield may also be used if it is uneconomical to haul in backfill material.

7.1 BACKFILL LAYER OF TRENCH

7.2 The backfill layer refers to the area of the trench above the bedding and padding layers to within 2 inches of final grade.

7.3 Backfill may contain rocks up to approximately 6 inches in diameter for areas maintained as mowed turf, and up to approximately 12 inches for all other areas unless specified. Frozen lumps of soil shall be broken up and pulverized prior to backfilling.

8.1 COVER SERVICES

8.2 All services shall be installed with a minimum of 18 inches of cover unless an underground structure prevents installation with the minimum cover. The service may be installed at a lesser depth provided it is adequately protected from anticipated external loads. Measures to protect the plastic pipe include bridging or sleeving.

9.1 CLEARANCES SERVICES

9.2 Shall be installed with a minimum of 6 inches of clearance from all parallel underground facilities when possible and a minimum of 4 inches clearance when crossing facilities at right angles.

9.3 If this clearance **cannot** be attained, a minimum clearance of 2 inches is permissible providing the service is suitably protected from damage that might result from the proximity of the other structure.

9.4 Joint Trench - Clearances for joint trench are more stringent. Refer to Joint Trench Section of this manual.

10.1 PROHIBITED INSTALLATIONS

10.2 Gas services shall not be located under floors, porches, garages, mobile home slabs, or any other permanent structure. Threaded pipe or fittings shall not be below grade on medium pressure services.

10.3 Never drive carrier pipe, use a casing or other method for installing the service pipe such as pneumatic boring or directional drilling.

10.4 Plastic piping shall not be installed above ground.

10.5 Avoid installing gas piping above or through leach fields or other corrosive areas.

11.1 INSTALLATION CONSIDERATIONS

11.2 It is not good practice to install a service line to house or building before earth fill has been placed around the foundation walls. Gas services should not be installed until the site is within 6 inches of final grade to alleviate problems associated with insufficient cover or excess depth

11.3 Plastic piping shall be installed in such a manner that shear and tensile stresses are minimized. The piping shall be laid on undisturbed or well-compacted soil and not supported by blocking.

11.4 The material used for backfill shall be free of rocks, building materials, etc., that might damage the pipe.

12.1 EXCESS FLOW DEVICES

12.2 All one and two family residences (including mobile homes) served from a medium pressure line normally operating at over 10 psig shall be equipped with an excess flow device incorporated near or at the main. Refer to manufacturers flow limiter information for flow capacity and maximum service length recommendations.

SECTION 6.00 HANDLING PLASTIC PIPE

- Handling Plastic Pipe
- References
- General Handling
- Transporting Plastic Pipe
- Storage Of Plastic Pipe
- Shelf Life Of Plastic Pipe

1.1 HANDLING PLASTIC PIPE

1.2 This section describes the handling and storage of plastic pipe.

2.1 REFERENCES

2.2 C.P. Chem., Performance Pipe, Piping Publication April 2002.

3.1 GENERAL HANDLING

3.2 Care should be exercised when handling plastic pipe to avoid dropping the pipe.

3.3 Pipe may be lifted using an approved pipe-lifting device, utilizing fabric or nylon slings, or by hand. **Wire rope or chain slings, chains, cables, or other metallic equipment shall not be used on the pipe**.

4.1 TRANSPORTING PLASTIC PIPE

4.2 During transportation of the plastic pipe from the storage area to the jobsite by Village or contractor crews, care should be exercised to avoid damage. The following precautions will apply:

4.2.1 The vehicle bed, racks or stanchions shall be covered with padding and shall be free of all sharp projections that could damage the pipe.

4.2.2 Plastic pipe shall not overhang the vehicle more than 3 feet. A red flag shall be secured to any length of pipe that overhangs the vehicle. The stacking height shall be such that no overhanging pipe bends.

4.2.3 The piping should be fastened tightly (to avoid movement) to the vehicle with cloth or nylon straps, **not with chains.**

5.1 STORAGE OF PLASTIC PIPE

5.2 Plastic pipe should be stored so as to minimize the possibility of the material being damaged by crushing or piercing. No temporary covering (tarps or black plastic sheets, etc.) shall be placed over this material.

5.2.1 The exact height to which plastic pipe can be stacked depends on many factors such as material, size, wall thickness, and ambient temperatures. At no time should the loading cause the pipe section to be forced out of round. Regardless of the method used to stack the sticks or coils, it must be stressed that adequate support be maintained to prevent damage to the plastic.

5.3 Stick Pipe

5.3.1 Bundles of Sticks: Bundles shall have a maximum stack of 90 inches.

5.3.2 Loose Sticks: Loose sticks shall be stacked in a pyramid pile with the following height limitations:

Pipe Sizes	Tiers High
2”	12
3”	12
4”	8
6”	7
8”	6
10”	5

5.4 Coil Pipe

5.4.1 When stored in horizontal stacks, the stack height shall be a maximum of 86 inches high.

5.4.2 Vertical storage of coils is permitted with the following cautions:

1. The coil should be stored on a surface that will not damage the pipe.
2. The coil should be properly blocked with tapered blocks to keep the coil from rolling.
3. The coil should be lifted to avoid cuts and scratches that may occur when sliding or rolling.

6.1 SHELF LIFE OF PLASTIC PIPE

6.2 The shelf life of all high-density plastic pipe shall not exceed 24 months from the extrusion date marked on the pipe surface.

6.2.1 No High Density plastic pipe or tubing older than 24 months (2 years) from date of extrusion shall be installed.

SECTION 7.00 HANDLING STEEL PIPE

- Handling
- References
- General Handling
- Transporting
- Storage

1.1 HANDLING STEEL PIPE

1.2 This section describes the handling and storage of steel gas pipe.

2.1 REFERENCES

2.2 NONE

3.1 GENERAL HANDLING

3.2 Care should be exercised when handling coated steel pipe to avoid damage to the pipe or coating.

3.2.1 Pipe shall be lifted with either slings, pipe calipers, or end-hooks only.

3.2.2 Pipe shall not be dumped on the ground.

3.2.3 Pipe shall be lifted from the truck by means of fabric or leather slings or using an approved pipe-lifting device. **Wire rope or chain slings, chains, cables, or other metallic equipment shall not be used on the coating of the pipe**.

4.1 TRANSPORTING STEEL PIPE

4.2 Care should be exercised when transporting coated steel pipe to avoid damage to the pipe or coating.

4.2.1 Vehicles and trailers used to haul pipe should have padded surfaces free of any appurtenances.

4.2.2 The piping should be fastened tightly (to avoid movement) to the vehicle with cloth or nylon straps, **not with chains**.

4.2.3 If the pipe is to be handled with a forklift, each level including the bottom row must be blocked on padded supports with sufficient space to allow the forklift device to be placed between pipe levels without striking an adjacent layer of piping.

5.1 STORAGE OF STEEL PIPE

5.2 Pipe must be stored on padded blocks and stacked to height limits to insure that the coating is not crushed by the pipe's weight when stacked too high.

5.3 The base for pipe storage is recommended to be at least 6 inches off the ground to minimize debris being thrown into the pipe.

SECTION 8.00 INSPECTION AND REPAIR OF DAMAGED PIPE NEW CONSTRUCTION

- Inspection And Repair Of Damaged Pipe
- References
- Plastic
- Steel

1.1 INSPECTION

1.2 All pipe shall be inspected for visible physical damage before it is lowered into the trench.

2.1 REFERENCES

2.2 Code of Federal Regulations, Transportation Title 49, Part 192, Subpart E and F.

2.3 NYCRR, Public Safety Title 16, Parts 255.307, 255.309, 255.311

3.1 PLASTIC

3.2 Any major imperfection in plastic pipe shall be removed.

3.3 Major imperfections include: a gouge or groove deeper than 10% of the wall thickness; a kink, or buckle.

3.4 If a bad fusion joint is suspected, the joint shall be removed and the pipe rejoined.

4.1 STEEL

4.2 Any imperfection in steel pipe shall be removed as a section.

4.3 An imperfection includes; A gouge or groove, a kink, buckle, arc burn, split seam, a shallow nick, or scratch.

4.4 All steel mains shall be jeeped while the pipe is blocked and again before it is lowered into the ditch.

SECTION 9.00 SQUEEZE OFFS

- Squeeze Offs
- References
- General
- Plastic Squeeze Off
- Notes

1.1 SQUEEZE OFFS

1.2 This section pertains to the use of approved squeeze off tools for use during emergency situations or when making a plastic tie in.

2.1 REFERENCES

2.2 Section 11.00 Bonding and Grounding

2.3 NYCRR, Public Safety Title 16, Parts 255.321

3.1 GENERAL

3.2 All squeeze-off tools shall be used in accordance with the manufacturer's instructions and recommendations.

3.3 Squeeze-off tools may be either Mechanical or Hydraulic. When hydraulic tools are used, they shall be provided with a mechanical lock-off device to prevent the tool from opening in the event that the hydraulic system fails.

3.4 During a squeeze-off, the velocity of the gas will increase as does the possibility of a static charge. Therefore, all cutting tools and squeeze-off tools shall be grounded accordingly.

4.1 PLASTIC SQUEEZE-OFF

4.2 All squeeze-off tools for plastic pipe shall be approved for use and have stops of the appropriate Standard Dimension Ratio (SDR) or (DR) for the pipe being squeezed or a torque-limiting device to prevent pipe damage during the procedure.

4.3 **The squeeze-off site must be at least (3) pipe diameters or 12",** whichever is greater, away from a prior squeeze location, fusion site, or mechanical fitting.

4.4 Whenever plastic pipe is squeezed-off, care must be taken to identify the squeeze-off location to prevent a second squeeze-off at the same location.

5.1 NOTES

5.2 If damage has occurred or may have occurred to plastic pipe during the squeeze-off operation, the affected area will be replaced.

5.3 The rate of squeeze or release shall be the same. A one-minute pause is required at wall contact, ¼ open, and at ½ open for pipe larger than 3 inches.

5.4 During freezing temperatures, closure rates should be halved and pauses should be doubled.

5.5 It is not necessary or advisable to "re-round" the plastic pipe by squeezing at a 90^{o} rotation of the initial squeeze.

5.6 After removal of the squeeze-off tool, a soap test shall be performed on the squeeze site.

5.7 **From the start of a squeeze-off on plastic pipe to the removal, the total time should not exceed 8 hours. Excessive time may damage the pipe.**

SECTION 10.00 INSTALLATION CONSIDERATIONS

- Installation Methods
- References
- Direct Burial Plastic Mains
- Direct Burial Steel Main
- Trenchless Construction General
- Plowing Plastic Pipe
- Safe Pull Strength-Plowing
- Horizontal Directional Drilling
- Bore Path Planning & Profiles – Directional Drilling
- Exploratory Soil Bores – Directional Drilling
- Rights Of Way - Directional Drilling
- Entry & Exit Angles – Directional Drilling
- Minimum Bend Radius – Directional Drilling
- Plastic Pipe Material Selection – Directional Drilling
- Quality Assurance – Directional Drilling
- Weak Link – Directional Drilling
- Weak Link Usage Table – Directional Drilling
- Tracer Wire Connection – Directional Drilling
- Pulling Head – Directional Drilling
- Back Reaming – Directional Drilling
- Pull Back – Directional Drilling

❖ Gauge Pigging – Directional Drilling

1.1 INSTALLATION METHODS

1.2 This section describes considerations and the various methods of installing gas pipelines.

2.1 REFERENCES

2.2 NYCRR, Public Safety Title 16, Part 255.321 Installation of Plastic Pipe.

2.3 NYCRR, Public Safety Title 16, Part 753, Protection of Underground Facilities.

2.4 American Society for Testing and Materials (ASTM) F1962-99, Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene pipe or Conduit Under Obstacles, Including River Crossings.

2.5 Trenchless Technology Technical Note No. 1, Plexco, Chevron, Horizontal Directional Drilling (Guided Boring) with Plexco Pipe, revision 1.

2.6 North American Society for Trenchless Technology (NASTT), First Edition, September 1995, Mini-Horizontal Directional Drilling Manual

3.1 DIRECT BURIAL PLASTIC MAINS

3.2 The direct burial of plastic mains shall be in accordance with all procedures and cautions stated in this Section.

3.3 Plastic pipe shall be installed with sufficient slack to provide for possible contraction. Normal uncoiling and placing in the trench will usually provide the necessary slack.

3.4 The bottom of the trench must continuously support plastic pipe with no pipe spans bridging low spots.

4.1 DIRECT BURIAL STEEL MAINS

4.2 Steel pipe installed below grade must conform to the bottom of the trench for continuous support or be supported by sandbags at intervals not to exceed 6 feet to minimize stress on the pipe.

4.3 Clean backfill or bedding material may be used to fill low spots to provide continuous support to the pipe.

5.1 TRENCHLESS CONSTRUCTION GENERAL

5.2 Whenever trenchless technology is used for installing mains, extreme caution must be exercised. It is important that all foreign facilities (e.g. telephone, sewer, water, etc.) be accurately located.

5.3 Test pits are required per Code Rule 753 to determine the location of all foreign facilities.

6.1 PLOWING PLASTIC PIPE

6.2 Plowing of PE pipe and tubing is an acceptable method of installation in soil conditions where it is not expected that pipe bedding and padding will be required.

6.3 When PE pipe is plowed in, it may be pulled in behind an expander cone, or planted in the ground through a chute. Care must be taken to not exceed the safe pull strength of the pipe, safe pull strength is defined as 40% of the tensile yield strength. Additionally, the minimum short-term bend radius that the pipe may be subjected to is 10 pipe diameters.

6.4 When PE pipe is subjected to short-term pull stresses, it will stretch somewhat without yielding but typically returns to its original length within 24 hours.

Additionally, the earth may be cooler than the pipe resulting in thermal contraction until the pipe temperature stabilizes. For these reasons, the pipe should be allowed to "relax" overnight before tie-ins are completed. Extra pipe should be left at each end of the plowed in segment to accommodate for any contraction that occurs. In the case of service tubing, slack may be provided at tie-in locations in lieu of the relaxation period.

6.5 **Fittings shall not be plowed in with the pipe**. Butt fusion joints are the only connection allowed to be plowed in with the pipe.

6.6 Vibratory plows are preferred over static plows. Plowing speed is limited by the safe pull strength of the pipe and should be held relatively constant once an acceptable speed is established. Sudden acceleration may damage the pipe and

is to be avoided. Pre-ripping, or plowing without installing pipe prior to installation, will reduce pull stresses on the pipe and can identify potential obstacles.

7.1 SAFE PULL STRENGTH – PLOWING & PULLING

7.2 Contact pipe manufacturer for the minimum short-term bend radius and maximum safe pull strength allowed for standard PE pipe sizes when Plowing or Planting only.

8.1 HORIZONTAL DIRECTIONAL DRILLING – PLASTIC PIPE

8.2 The following guide has been developed as an aid for the layout, design, and installation of plastic Horizontal Directional Drilling (HDD) installations where conventional pipe installations are not an option.

9.1 BORE PATH PLANNING AND PROFILES – DIRECTIONAL DRILLING

9.2 When a location has been chosen for the directional drill, the area should be profile surveyed and detailed drawings prepared. The accuracy of the drill profile and alignment is dependent on the accuracy of the profile survey information.

9.3 The alignment of the bore path has much to do with the forces acting on the pipe during the pullback operation; the straighter the alignment, the less force acting on the pipe. The pullback forces applied to the pipe will depend upon the following; the buoyant forces acting on the pipe cause frictional drag between the pipe and the top of the borehole, resistance due to stiffness at curves along the bore path, the lubricity and viscosity of the drilling fluid referred to as “hydrokinetic drag”, the cutting mixture, weight of groundwater, and soil conditions.

10.1 EXPLORATORY SOIL BORES – DIRECTIONAL DRILLING

10.2 It is generally recommended to have exploratory soil bores performed in locations where directional drilling is contemplated to determine subsurface soil conditions.

10.3 The number of exploration holes is a function of the length of the proposed crossing and complexity of subsurface soils. There should be at least 2 bores performed for a 1000-foot directional drill, and it is important to note that the exploratory drill must extend to the depth of the directional drill. The exploration holes shall not be located exactly over the profile of the proposed drill. All drill hole

shall be filled with grout or other approved material.

10.4 The state DOT or other agencies may already have this information. The Regional DOT Engineering offices should be contacted to determine if this information is available.

10.5 If rock is encountered during the soil bores, it is important to determine the type, hardness, and strength. The type of rock can be obtained during the soil bore procedure, and a geologist can determine the rock quality designation, the hardness designation, and compressive strength. It is important to provide this information to the directional-drilling contractors so that they can determine their equipment requirements and accurately price the installation.

10.6 The soil conditions found during the exploratory soil bore process will allow the driller to determine the proper drilling fluid and additives required to provide stability to the bore hole and to transport the cuttings from the bore hole to the containment pit. The exploratory soil bores will also provide the driller with information needed to select the drilling head and back reamer.

11.1 RIGHTS OF WAY – DIRECTIONAL DRILLING

11.2 There should be enough permanent or temporary ROW obtained to provide room for construction equipment and reclamation pits. There should also be sufficient temporary right-of-way obtained for the entire drill string to lay prior to the pullback operation. There should not be a time delay between the back reaming operation and the pullback. Any interruptions could be cause for collapse of the back- reamed hole or damage to the pull string.

12.1 ENTRY AND EXIT ANGLES – DIRECTIONAL DRILLING

12.2 The preferred entry and exit angles are between 14 and 20 degrees. The entry angles are generally greater due to difficulties encountered starting the head of the drill into the ground.

12.3 The entry and exit angles have a direct effect on the estimated average arc curvature radius of the pipe and the estimated horizontal distance required achieving depth or rising from entry or exit locations.

13.1 MINIMUM BEND RADIUS – DIRECTIONAL DRILLING

13.2 The minimum bending radius of a HDD crossing should not be less than 100 feet to reduce frictional forces and to avoid possible kinking or egging the pipe.

13.3 A tight bend radius has a direct effect on the required pullback force acting on the drill string. As a rule of thumb, the steel drill rod is limited to a 100-foot radius for each 1" diameter of drill rod.

14.1 PLASTIC PIPE MATERIAL SELECTION – DIRECTIONAL DRILLING

14.2 High Density pipe is recommended for all Directional Drilling applications. High Density pipe has roughly double the short term safe pull strength and has a higher resistance to abrasion.

15.1 QUALITY ASSURANCE – DIRECTIONAL DRILLING

15.2 Pipeline fusions for long distance bores should be ultrasonically tested to assure the joints are of the best possible quality to withstand the potential stresses of the directional bore.

16.1 WEAK LINK – DIRECTIONAL DRILLING

16.2 A weak link should be utilized to assure the pipe string is protected from exceeding the Short Term Safe Pull Strength. The Weak Link Usage Table below provides the proper weak link selection based on temperature and duration of pullback.

16.3 An adjustable Borzall Breakaway Connector should be used to set the proper breakaway value to assure the short term safe pull strength is not exceeded. The Borzall Connector has an interchangeable selection of pins to provide breakaway values from 750 LBS up to 13500 LBS in 250-LB increments by selective usage of the Breakaway Pins.

16.4 Refer to the Weak Link Usage Table to determine proper values for directional drilling.

HORIZONTAL DIRECTIONAL DRILLING WEAK LINK USAGE TABLE

Pipe Size	SDR	HDPE Weak Link Value
2	11	1250#
4	11	5000#
6	11	12000#
8	11	20000#
10	11	25000#

Weak Link Values have been de-rated for pipe temperatures of 100ºF and for pull durations over one hour.

17.1 TRACER WIRE CONNECTION – DIRECTIONAL DRILLING

17.2 The standard 49 strand stainless steel #10 wire should be used.

17.3 The wire should be connected to the pulling head with cable clamps.

18.1 PULLING HEAD – DIRECTIONAL DRILLING

18.2 A transition fitting should be utilized for the transition from the steel back reamer to the plastic pull string. The open end will be fabricated shut with a pipe cap and an eyebolt installed to attach the back reamer.

19.1 BACK REAMING – DIRECTIONAL DRILLING

The back reamer is used to enlarge the drilled hole to facilitate the installation of the drill string. The back ream must be at least 1½ times the size of the drill string to allow for an annular space for return of drilling fluid and cuttings (spoil) to the containment pit. Refer to the Back Reamer Sizing Table below for proper sizing.

Back Reamer Sizing Table	
Pipe Size Nominal, Inch	**Back Reamer Size, Minimum, Inch**
2	5
4	6
6	8
8	10
10	12
12	16

19.2 There are a variety of back reamers for different soil conditions encountered; these are, a blade reamer for soft soil, a barrel reamer for mixed soil, and a carbide tipped back reamer for rock formations.

19.3 The back reamer must have a swivel head to avoid twisting the pipe string.

20.1 PULLBACK - DIRECTIONAL DRILLING

20.2 There should not be a time delay between the back reaming operation and the pullback. Any interruptions could be cause for collapse of the back reamed hole and damage to the pull string.

20.3 After the pullback, the pipe should be allowed to recover from the stress effects of directional drilling. A relaxation period is required and should range from 8 to 24 hours.

21.1 GAUGE PIGGING – DIRECTIONAL DRILLING

21.2 The final acceptance of a HDD crossing is to pig the pipeline to assure the pipeline inside diameter is constant and without obstruction.

21.3 A “T.D. Williamson Option All Pig” fitted with a slotted aluminum gauging flange installed on the leading edge should be used. The gauging flange and Option All pig is available for pipe sizes larger than 2”.

21.4 The Option All pig must have the cups machined to match the ID of the plastic pipe.

21.5 The gauging flange must be machined to 93% of the pipe ID after subtracting for the size of the fusion beads.

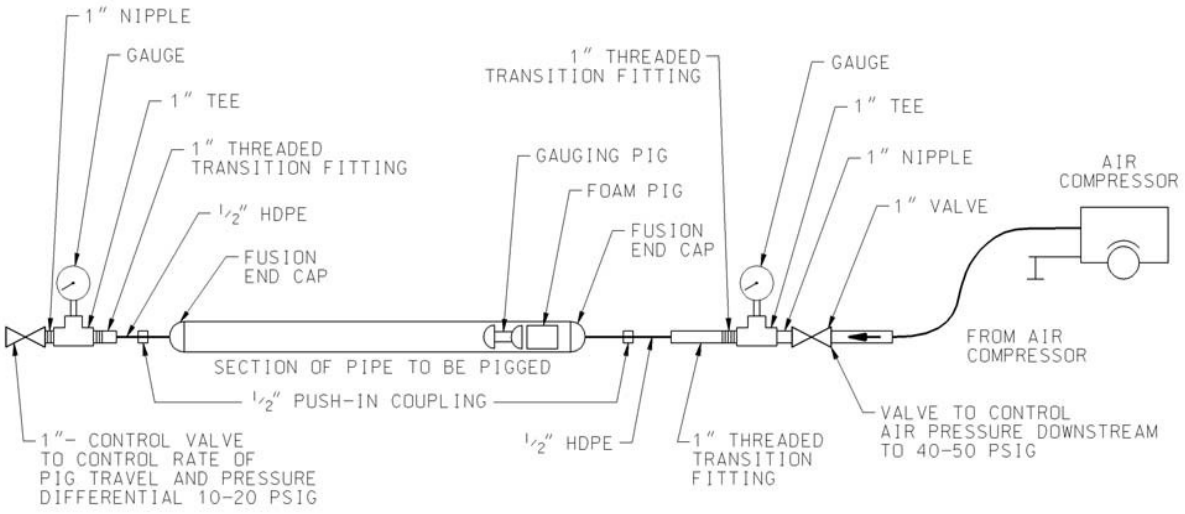
21.6 Special consideration should be made to limit the speed at which the pig travels during this operation. Refer to the Directional Drilled Pipeline Gauge Pig Process Detail Diagram No. PD-1 to set up for gauge pigging.

21.7 If, after pigging, the leading edge of the plate is bent, it may be an indication of a possible bend or kink of the drill string. In any case, further investigation should be undertaken to investigate the cause.

21.8 The condition of the sizing plate will be used to determine if the directional-drilled pipeline is acceptable to the Village and justify payment to the drilling contractor for performance under the contract.

PD-1

DIRECTIONAL DRILLED PIPELINE GAUGING PIG PROCESS DETAIL



NOTE: 1. 1" CONTROL VALVE TO BE ADJUSTED TO MAINTAIN APPROX 30# PRESSURE DIFFERENTIAL TO REDUCE VELOCITY OF GAUGING PIG.
2. GAUGING FLANGE. OPTION ALL BATCH PIG AND FOAM PIG ARE AVAILABLE THRU KERR ENGINEERED SALES CO.

T.D.W OPTION ALL BATCHING PIG WITH CUPS MACHINED FOR MDPE AND HDPE APPLICATIONS. USED IN CONJUNCTION WITH PROPER SLOTTED ALUMINUM GAUGING FLANGE.

PIPE SIZE	MDPE	HDPE
4"	3.794"	3.5"
6"	5.463"	5.153"
8"	8.625"	6.709"

T.D.W SLOTTED ALUMINUM GAUGING FLANGE

PIPE SIZE	MDPE	HDPE
4"	3.30"	3.02"
6"	4.73"	4.44"
8"	6.30"	5.77"

SECTION 11.00 BONDING AND GROUNDING

- Bonding And Grounding
- References
- Bonding Steel Pipe
- Grounding Plastic Pipe

1.1 BONDING AND GROUNDING

1.2 This section describes the requirement of bonding steel pipe and grounding plastic pipe prior to separating when it is necessary to make repairs or completing tie ins.

2.1 REFERENCES

2.2 National Electric Safety Code

3.1 BONDING STEEL PIPE

3.2 Whenever separating steel mains temporary bonding clamps shall be installed around the point of separation to provide a path for any current that might be on the main. **Magnetic Bonding Clamps shall not be used because they do not provide a reliable means of electrical conductivity.**

3.3 A #8 AWG copper flexible wire is the minimum size bonding wire to be used for bonding. A #2 AWG flexible wire is the minimum size wire to be used when bonding in stray current areas, or in proximity of high voltage power lines.

4.1 GROUNDING PLASTIC PIPE

4.2 Plastic pipe is not an electrical conductor, but it is easily charged with static electricity. This charge may accumulate on the inside or the outside of the pipe as a result of handling or internal turbulence and friction due to flowing gas.

4.3 Whenever plastic pipe is placed in contact with a foreign object, it is possible to discharge in the form of a spark. For this reason it is important to provide a ground path when making repairs or handling pipe in situations where live gas could be present.

4.4 Static grounding must be applied prior to joining two separated pieces of plastic piping together, separating a piece of existing plastic piping, or making repairs to damaged plastic pipe. The antistatic kit is applied to the ends of the existing pipe prior to separating and making repairs. The Anti- Static Kit shall be used for all situations needing static preventative measures. Burlap soaked in a soap/water solution is acceptable in an emergency.

SECTION 12.00 BENDS

- Bends
- References
- Plastic Pipe
- Minimum Bend Radius of Plastic Pipe
- Steel Pipe
- Location of Longitudinal Weld Seam
- Location of Circumferential Weld

1.1 BENDS

1.2 This section pertains to bends in plastic pipe that can be achieved during open trench construction. If directional drilling, pulling or plowing plastic pipe refer to Directional Drilling Installation methods for minimum bend radius.

1.3 The intent of this section is to produce bends which shall minimize distortion of the pipe and which in no way impair the strength of the pipe.

1.4 A change in direction that will exceed the minimum bend radius as detailed in this section must use manufactured fittings to achieve the desired direction change.

2.1 REFERENCES

2.2 NYCRR, Public Safety Title 16, Part 255.313

3.1 PLASTIC PIPE

3.2 Plastic pipe may be bent, with a minimum bend radius of twenty times the pipe diameter during open trench construction.

3.3 All bends should be inspected for possible damage; any damaged section shall be removed and replaced with a new section of pipe.

3.4 Only factory built, prefabricated mitered joints are permitted.

4.1 MINIMUM BEND RADIUS OF PLASTIC PIPE & TUBING

4.2 Bends are to be used wherever possible. If a bend will exceed the minimum bend radius an elbow shall be used.

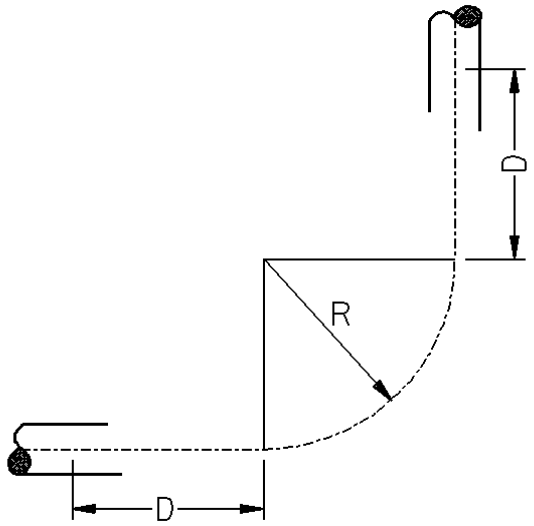
4.3 Straight runs of plastic pipe without fittings or fusions can accommodate a minimum bend radius no less than 20 times the pipe diameter. See Table 1 and Figure 1.

4.4 When the pipe is bent, there shall be no fusion or mechanical joints within the bend or within 20 pipe diameters on either side of the bend.

4.5 Care shall be taken so as to not damage or kink the plastic pipe or to reduce flow. If the plastic pipe becomes kinked, the kinked section must be cut out.

TABLE 1

MINIMUM BENDING RADIUS FOR PLASTIC PIPE WITHOUT FITTINGS	
Plastic Pipe Size	**Minimum Bend Radius R & Minimum Distance From Bend Distance For Fitting Installation (D)**
.5” CTS	1’ 1”
1” CTS	2’
1.25” IPS	2’ 10”
2” IPS	4’
4” IPS	6’ 8”
6” IPS	10’
8” IPS	13’ 4”
10” IPS	16’ 6”



R = THE MINIMUM BENDING RADIUS IS 20 PIPE DIAMETERS.
D = THE MINIMUM DISTANCE FROM THE BEND TO THE NEAREST FITTING OR FUSION IS 20 PIPE DIAMETERS.

FIGURE 1

5.1 STEEL PIPE

5.2 All bends shall be done cold producing a smooth bend. No hot or wrinkle bends will be allowed. Bends shall be made using a type of bending machine approved by the Village, and if necessary an internal bending mandrel may be used.

5.3 All over-bends shall be made in such a manner so that the midpoint of the bend when installed shall clear the high point of the trench bottom. All sag bends shall be fitted snug to the bottom of the ditch.

5.4 The distance between centerlines of bending points shall be such that there shall be no distortion of the pipe or of any previously made bend and the distance shall not in any case be closer than one (1) pipe diameter.

5.5 When bending is required, the recommended bending radius for pipe smaller than 12 inch is 18 pipe diameters.

5.6 No bend shall produce wall thickness thinning exceeding 10% of the pipe wall as measured through the use of an ultra-sonic thickness gauge.

5.7 All bends shall be measured for ovality using a caliper. If the bend has produced an ovality that exceeds 2.5% of the pipe OD it shall be cut out.

5.8 All over-bends, sag-bends, or side-bends shall be made before any cleaning, priming, or wrapping operations, and shall be installed in such a manner so that an adequate amount of slack is provided in the line.

5.9 Any pipe that has been buckled or gouged as a result of the bending process shall be cut out and replaced.

5.10 After bending, the coating integrity shall be checked using a high voltage short locater (Jeep).

6.1 LOCATION OF LONGITUDINAL WELD SEAM

6.2 The longitudinal weld (seam) of the pipe should be located as near as possible to the neutral axis of the bend unless.

A) The bend is made with an internal bending mandrel

OR

B) The pipe OD is less than 12”

OR

C) The diameter to wall ratio is less than 70.

R=D/W
R is the ratio
D is the pipe outside diameter
W is the wall thickness in inches

6.3 The longitudinal seam is the location on the pipe that is not in tension or compression relative to the completed bend.

7.1 LOCATION OF CIRCUMFERENTIAL WELD

7.2 No bends shall be made within 4 feet of a circumferential weld or open end of the pipe joint in a pipe having a diameter of less than 16 inches.

7.3 If because of unusual circumstances this limitation may be waived, provided that any circumferential weld closer to a bend segment than permitted is subjected to an X-ray inspection.

7.4 Bends in which a circumferential weld is located within the bend shall not be permitted.

SECTION 13.00 JOINING OF PIPE - DISTRIBUTION

- Joining of Pipe
- References
- Couplings
- Welding

1.1 JOINING OF PIPE

1.2 This section details alternate joining methods for steel pipe such as mechanical couplings.

2.1 REFERENCES

2.2 Village of Hamilton Welding Procedures Manual

3.1 COUPLINGS

3.2 Mechanical couplings may be used for joining steel to steel, steel to plastic, and plastic to plastic.

3.3 All mechanical couplings shall be seal and restraint where available

4.1 WELDING

4.2 Welding is the preferred method of joining steel for main construction in all pressure ranges. All welding will be done according to the guidelines established in the Village of Hamilton Welding Procedures Manual.

4.2 Any main located in unstable soils should be constructed with steel pipe.

SECTION 14.00 JOINING OF PLASTIC PIPE

- Joining Of Plastic Pipe
- References
- Plastic Joining Tasks- Preferred and Alternate Joining Methods

1.1 JOINING OF PLASTIC PIPE

1.2 This section details preferred and alternative joining methods for plastic pipe that encompasses leak repairs, tie ins, service tee connections, and joining of coil and stick pipe ends for open trench installation, pipe pulling, and directional drilling.

2.1 REFERENCES

2.3 NYCRR, Public Safety Title 16, Part 255.281

2.4 Village of Hamilton Gas Operating and Maintenance Procedures Manual Procedure 2.00

2.5 Section 22.00 Plastic Batch Numbers

3.1 PLASTIC JOINING TASKS – PREFERRED AND ALTERNATE METHODS

3.2 See attached Joining Table. For joining procedures and qualification requirements refer to Village of Hamilton Gas O&M Manual, Procedure 2.00.

3.3 It is preferable to install plastic service pipe as one continuous length. Where it is necessary to use more than one length of pipe, the lengths shall be joined by one of the methods in the Plastic Joining Tasks – Preferred & Alternate Methods table.

Plastic Joining Tasks – Preferred & Alternate Methods			
Task	**Material**	**Preferred Method**	**Alternate Method(s)**
Leak Repair ½" – 2"	HDPE	Stab Coupling	
Tie-In	HDPE	Electrofusion	Mechanical Butt Fusion
Hi-Volume Tee	HDPE	Electrofusion	None
Service Tee 8" & 10"	HDPE	Electrofusion	None
Service Tee 2" – 6" Main	HDPE	Mechanical	Electrofusion
Join Coil Pipe for Open Trench Install	HDPE	Electrofusion	Butt Fusion Mechanical
Join Coil Pipe for Directional Pull	HDPE	Butt Fusion	None
Join Stick Pipe	HDPE	Butt Fusion	Electrofusion Mechanical
Directional Bore - Tie-In With MDPE	HDPE	Electrofusion	Mechanical
Directional Bore - Tie-In With HDPE	HDPE	Butt Fusion	Electrofusion Mechanical
Cross Join Materials		Electrofusion	Mechanical

SECTION 15.00 SERVICE CONNECTIONS

- Service Connections
- References
- General
- Service Matrix
- Drawings

1.1 SERVICE CONNECTIONS

1.2 This section provides detailed illustrations of approved materials for service connections at the main (main end) and riser connections at the house (house end).

2.1 REFERENCES

2.2 NYCRR, Public Safety Title 16, Part 255.367, 255.375

2.3 American Society of Mechanical Engineering (ASME), Gas Transmission and Distribution Piping Systems, ASME B31.8 - 1999 Edition.

2.4 Department of Transportation (DOT), Part 192, 49 CFR.

3.1 GENERAL

3.2 Refer to manufacturers Flow Limiter information to determine the proper selection of flow limiters for the anticipated connected load.

3.3 The Perfection Mechanical Tees used are equipped with integral flow limiters and have been standardized to include a Powell 400 CFH EFV with a .5" outlet and a Powell 800 CFH EFV with a 1" outlet.

3.4 There are additional stab end flow limiters available in .5", 800 CFH and 1.25", 1800 CFH sizes if needed. Please note the limiter ratings are based on 10 PSIG inlet, the capacity of the flow limiter increases with main pressure.

3.5 All HDPE services without a flow limiter shall be equipped with a curb valve located as close to the service connection as practical.

4.0 SERVICE CONNECTION MATRIX

Service Connection Matrix

Main Pressure	Main Material	Service Material	Main Size	Main Wall Thickness	Service Size	Flow Limiter Equipped	Service Connection Type
Medium Pressure to 100 psig	HDPE	HDPE	2" & 4"	SDR 11.0	.5" - 1"	Y	Mechanical
			6" only			*	
			8" & 10"			*	Electrofusion
			2" -10"		2"	N	

*See drawing notes for flow limiter and valving requirements.

5.0 Drawings

Drawing Numbers:

S-100 House End Service Connections

S-200 Main End Mechanical Service Connections

S-300 2" & 4" PE Main Mechanical Service Connections

S-400 6" PE Main Mechanical Service Connections

S-500 8" & 10" PE Main Electrofusion Service Connections

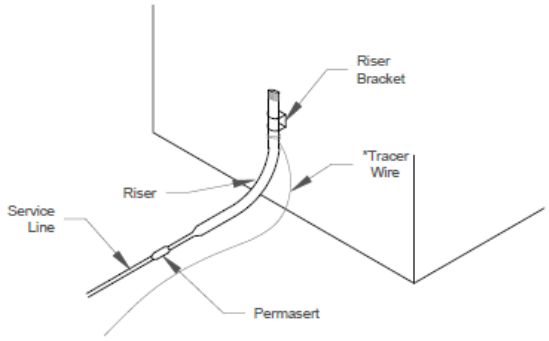
S-600 2" to 10" PE Main Electrofusion 2" Service Connections

HOUSE END CONNECTIONS

PLASTIC - MP

0 to 100 PSIG

ABOVE GROUND



* Tracer wire wrapped around riser, but not connected electrically.

1/2" SERVICE

Riser Flex
Riser Rigid
Bracket 7 3/4" Offset

1" SERVICE

Riser Flex
Riser Rigid
Bracket 7 3/4" Offset

2" SERVICE

Riser Rigid
Bracket Adjustable 12" - 16"

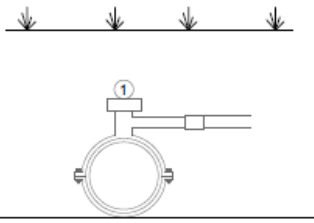
DWG TITLE
MEDIUM PRESSURE, HOUSE END SERVICE CONNECTIONS

VILLAGE OF HAMILTON
SCALE: NTS
DRAWN BY: INTEGRITY ENGINEERING

DWG NO.
S-100

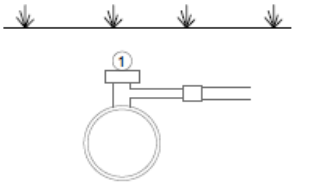
HDPE Mechanical Service Connections
Medium Pressure 0-100 PSIG

1/2" Service from 2", 4" & 6" PE main w/ limiter
1" Service from 2", 4" & 6" PE main w/ limiter



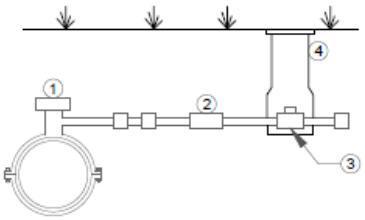
1	Tee Serv Mech 2"x0.5" DR 7 400 CFH EFV HDPE
	Tee Serv Mech 2"x1" DR 11 800 CFH EFV HDPE
	Tee Serv Mech 4"x0.5" DR 7 400 CFH EFV HDPE
	Tee Serv Mech 4"x1" DR 11 800 CFH EFV HDPE
	Tee Serv Mech 6"x0.5" DR 7 CFH EFV HDPE
	Tee Serv Mech 6"x1" DR 11 CFH EFV HDPE

1/2" Service from 8" & 10" PE main w/o limiter
1" Service from 8" & 10" PE main w/o limiter



1	Tee Serv MDPE 10"x0.5" DR 7 Stab No EFV
	Tee Serv MDPE 10"x1" DR 11 Stab No EFV
	Tee Serv MDPE 8"x0.5" DR 7 Stab No EFV
	Tee Serv MDPE 8"x1" DR 11 Stab No EFV
2	Flow Limiter 400 CFH 0.5 SDR 7 stab
	Flow Limiter 800 CFH 1 SDR 11 stab
3	Valve HDPE Ball 0.5 CTS stab SDR 7
	Valve HDPE Ball 1 CTS stab SDR 11
4	Box Curb 2.5 Complete w/ Kerotest Support
	Box Curb 2.5 Complete w/ Kerotest Support

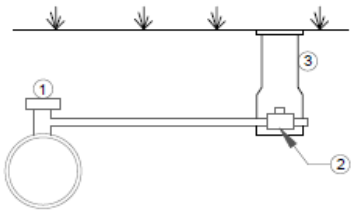
1/2" Service from 2", 4" & 6" PE main w/o limiter
1" Service from 2", 4" & 6" PE main w/o limiter



1	Tee Serv Mech 2"x0.5" SDR 7 No Flow HDPE
	Tee Serv Mech 2"x1" SDR 11 No Flow HDPE
	Tee Serv Mech 4"x0.5" SDR 7 No Flow HDPE
	Tee Serv Mech 4"x1" SDR 11 No Flow HDPE
	Tee Serv Mech 6"x0.5" SDR 7 No Flow HDPE
	Tee Serv Mech 6"x1" SDR 11 No Flow HDPE
2	Flow Limiter 400 CFH 0.5 SDR 7 stab
	Flow Limiter 800 CFH 1 SDR 11 stab
3	* Valve HDPE Ball 0.5 CTS stab SDR 7
	Valve HDPE Ball 1 CTS stab SDR 11
4	Box Curb 2.5 Complete w/ Kerotest Support

* Used only when Flow Limiter is Not Required

2" Service from PE main w/o limiter

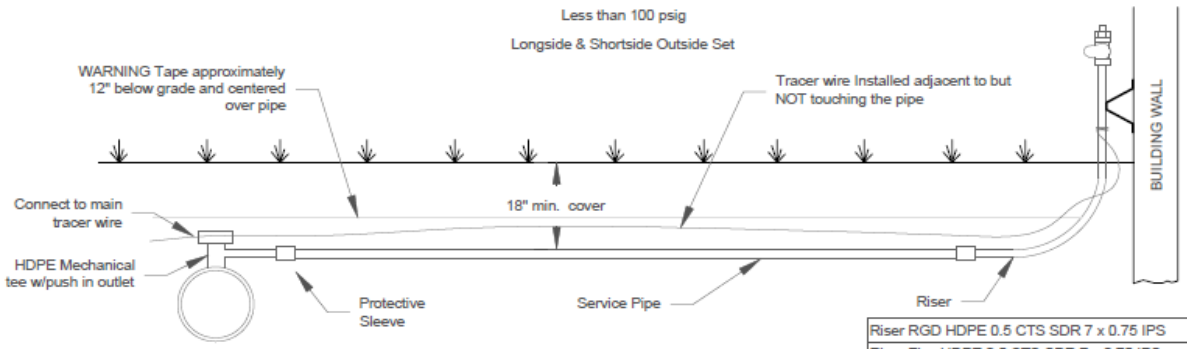


1	Tee Plastic Self-Tapping HI Volume 2"x2" SDR 11
	Tee Plastic Self-Tapping HI Volume 4"x2" SDR 11
	Tee Plastic Self-Tapping HI Volume 6"x2" SDR 11
	Tee Plastic Self-Tapping HI Volume 8"x2" SDR 11
	Tee Plastic Self-Tapping HI Volume 10"x2" SDR 11
2	Valve HDPE Ball 2" RP Butt SDR 11
3	Valve Box 2" Top & Bottom In road

HDPE Service - Direct Buried

Less than 100 psig

Longside & Shortside Outside Set



	Riser RGD HDPE 0.5 CTS SDR 7 x 0.75 IPS
	Riser Flex HDPE 0.5 CTS SDR 7 x 0.75 IPS
Pipe HDPE 0.5 CTS SDR 7 500' coil	Riser Flex HDPE 0.5 CTS SDR 7 x1 IPS
Pipe HDPE 1 CTS SDR 11 500' coil	Riser RGD HDPE 1 CTS SDR 11 x 1 IPS

DWG TITLE
MEDIUM PRESSURE, MAIN END MECHANICAL SERVICE CONNECTIONS

VILLAGE OF HAMILTON

SCALE: NTS

DRAWN BY: INTEGRITY ENGINEERING

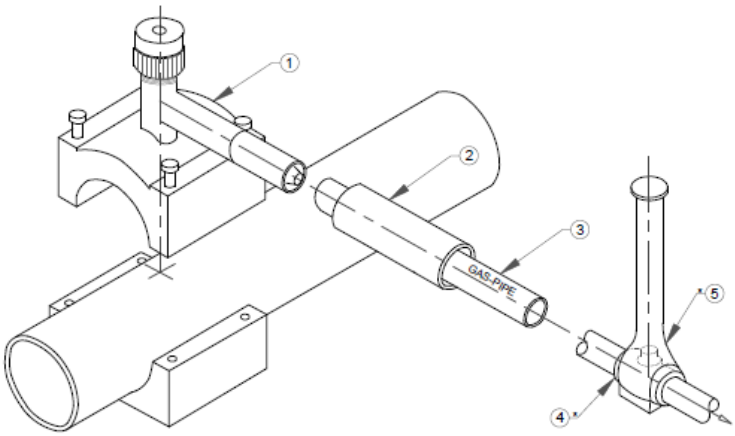
DWG NO.
S-200

PLASTIC M.P. HDPE MAIN WITH 0.5" OR 1" HDPE PLASTIC MECHANICAL SERVICE TEE

MAIN SIZE
2" & 4"

SERVICE SIZE
0.5" CTS SDR 7 HDPE
1" CTS SDR 11 HDPE

* VALVE MUST BE INSTALLED WHEN NO FLOW LIMITER IS USED.



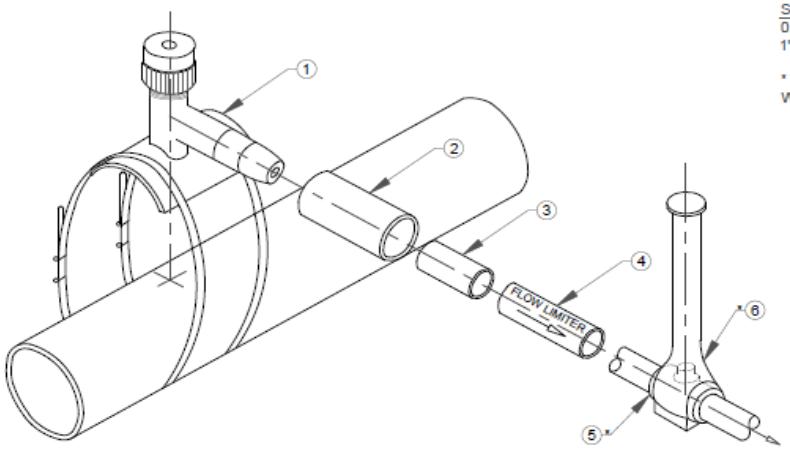
1	TEE SERVICE MECH 2" x 0.5" SDR 7 400 CFH EFV HDPE
	TEE SERVICE MECH 2" x 0.5" SDR 7 NO FLOW HDPE
	TEE SERVICE MECH 2" x 1" SDR 11 800 CFH EFV HDPE
	TEE SERVICE MECH 2" x 1" SDR 11 NO FLOW HDPE
	TEE SERVICE MECH 4" x 0.5" SDR 7 400 CFH EFV HDPE
	TEE SERVICE MECH 4" x 0.5" SDR 7 NO FLOW HDPE
	TEE SERVICE MECH 4" x 1" SDR 11 800 CFH EFV HDPE
	TEE SERVICE MECH 4" x 1" SDR 11 NO FLOW HDPE
2	PROTECTIVE SLEEVE (INCLUDED IN MECHANICAL TEE KIT)
3	PIPE HDPE 0.5" CTS SDR 7 500' COIL
	PIPE HDPE 1" CTS SDR 11 500' COIL
4	VALVE 0.5" CTS SDR 7
	VALVE 1" CTS SDR 11
5	BOX CURB 2.5" SNAPLOCK PLASTIC KEROTEST

DWG TITLE
MEDIUM PRESSURE, 2" & 4" PE MAIN MECHANICAL SERVICE CONNECTIONS

VILLAGE OF HAMILTON
SCALE: NTS
DRAWN BY: INTEGRITY ENGINEERING

DWG NO.
S-300

PLASTIC M.P. HDPE MAIN WITH 0.5" OR 1" HDPE PLASTIC MECHANICAL SERVICE TEE



MAIN SIZE
6" ONLY

SERVICE SIZE
0.5" CTS SDR 7 HDPE
1" CTS SDR 11 HDPE

* VALVE MUST BE INSTALLED WHEN NO FLOW LIMITER IS USED.

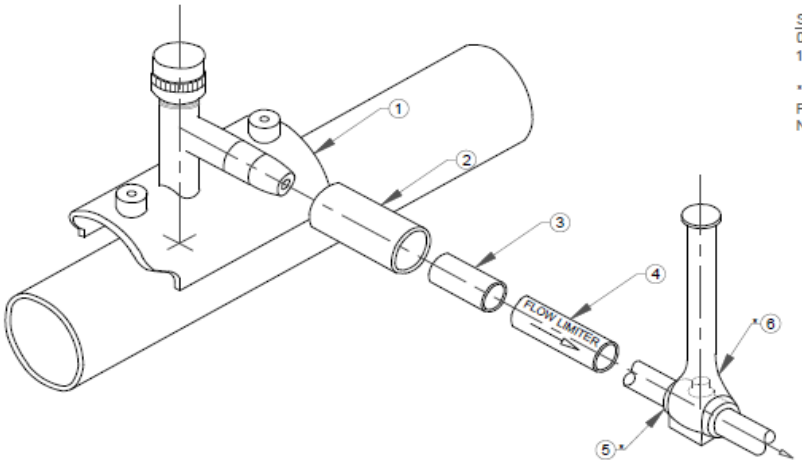
1	TEE SERVICE MECH 6" x 0.5" SDR 7 NO FLOW HDPE
	TEE SERVICE MECH 6" x 1" SDR 11 NO FLOW HDPE
2	PROTECTIVE SLEEVE (INCLUDED IN MECHANICAL TEE KIT)
3	PIPE HDPE 0.5" CTS SDR 7 500' COIL
	PIPE HDPE 1" CTS SDR 11 500' COIL
4	FLOW LIMITER 400 CFH 0.5" SDR 7
	FLOW LIMITER 800 CFH 1" SDR 11
5	VALVE 0.5" CTS SDR 7
	VALVE 1" CTS SDR 11
6	BOX CURB 2.5" SNAPLOCK PLASTIC KEROTEST

DWG TITLE
MEDIUM PRESSURE, 6" PE MAIN MECHANICAL SERVICE CONNECTIONS

VILLAGE OF HAMILTON
SCALE: NTS
DRAWN BY: INTEGRITY ENGINEERING

DWG NO.
S-400

PLASTIC M.P. MAIN WITH 0.5" OR 1" HDPE PLASTIC ELECTROFUSION SERVICE TEE



MAIN SIZE
8" & 10" ONLY

SERVICE SIZE
0.5" CTS SDR 7 HDPE
1" CTS SDR 11 HDPE

* VALVE MUST BE INSTALLED AT PROPERTY LINE OR MAIN WHEN NO FLOW LIMITER IS INSTALLED.

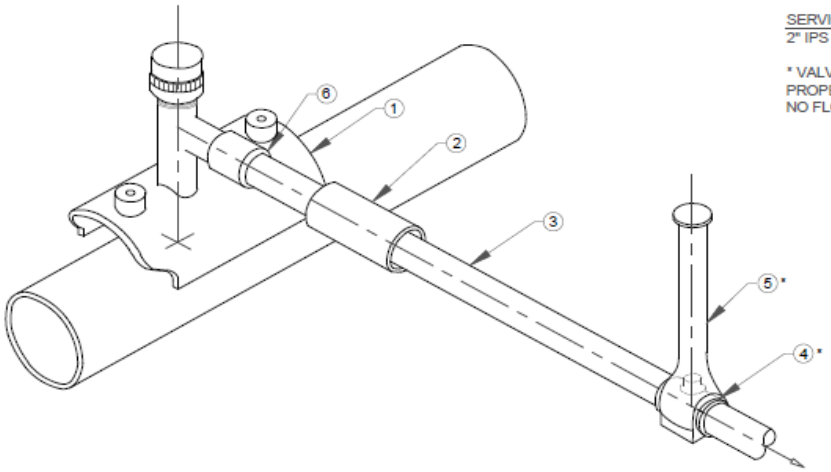
1	TEE SERVICE EF 8" x 0.5" SDR 7 STAB NO EFV
	TEE SERVICE EF 8" x 1" SDR 11 STAB NO EFV
	TEE SERVICE EF 10" x 0.5" SDR 7 STAB NO EFV
	TEE SERVICE EF 10" x 1" SDR 11 STAB NO EFV
2	PROTECTIVE SLEEVE (INCLUDED IN TEE KIT)
3	PIPE HDPE 0.5" CTS SDR 7 500' COIL
	PIPE HDPE 1" CTS SDR 11 500' COIL
4	FLOW LIMITER 400 CFH 0.5" SDR 7
	FLOW LIMITER 800 CFH 1" SDR 11
5	VALVE 0.5" CTS SDR 7
	VALVE 1" CTS SDR 11
6	BOX CURB 2.5" SNAPLOCK PLASTIC KEROTEST

DWG TITLE
MEDIUM PRESSURE, 8" & 10" PE MAIN ELECTROFUSION SERVICE CONNECTIONS

VILLAGE OF HAMILTON
SCALE: NTS
DRAWN BY: INTEGRITY ENGINEERING

DWG NO.
S-500

PLASTIC M.P. MAIN WITH 2" HDPE
PLASTIC ELECTROFUSION SERVICE TEE



MAIN SIZE
2", 4", 6", 8", 10"

SERVICE SIZE
2" IPS SDR 11 HDPE

* VALVE MUST BE INSTALLED AT PROPERTY LINE OR MAIN WHEN NO FLOW LIMITER IS INSTALLED.

1	TEE PLAS SELF TAPPING HI VOLUME 2" x 2" HDPE
	TEE PLAS SELF TAPPING HI VOLUME 4" x 2" HDPE
	TEE PLAS SELF TAPPING HI VOLUME 6" x 2" HDPE
	TEE PLAS SELF TAPPING HI VOLUME 8" x 2" HDPE
	TEE PLAS SELF TAPPING HI VOLUME 10" x 2" HDPE
2	PROTECTIVE SLEEVE 2.5 x 24
3	PIPE HDPE 2" IPS SDR 11 500' COIL
4	VALVE, HDPE 2" IPS RP BUTT SDR 11
5	BOX VALVE 2" TOP AND BOTTOM IN ROAD
6	OPTIONAL CONNECTION 2" HDPE ELECTROFUSION COUPLING

DWG TITLE
MEDIUM PRESSURE, 2" to 10" PE MAIN ELECTROFUSION 2" SERVICE CONNECTIONS

VILLAGE OF HAMILTON
SCALE: NTS
DRAWN BY: INTEGRITY ENGINEERING

DWG NO.
S-600

SECTION 16.00 PIGGING

- Pigging
- References
- General Cleaning

1.1 PIGGING

1.2 This section describes the requirements for pigging gas mains to remove foreign materials from new lines prior to energizing. The operation of pigging will remove construction debris such as; paper, mud, water, etc.

2.1 REFERENCES

2.2 None.

3.1 GENERAL CLEANING

3.2 All pipelines two inches in diameter and larger shall be pigged prior to tie-in. Compressed air may be used for all other pipelines.

3.2.1 Short sections less than 100 feet and tie in sections do not require pigging but due to construction conditions may be pigged if needed.

3.3 All plastic pipelines shall be cleaned with a squeegee type pig of suitable size.

3.3.1 Pigs shall be supplied by the Contractor and approved by the Construction Inspector.

3.4 The pigging operation may require numerous passes to properly clean the pipeline. The Construction Inspector shall witness final pigging operations.

SECTION 17.00 VALVES

- Valve Requirements
- Main Valves
- Installations

1.1 VALVE REQUIREMENTS

The primary purpose of main line valves in distribution systems is to shut off the flow of gas in the event of an emergency. However they may also be installed for future anticipated main extensions.

Main line valves can represent a significant capital investment, and a long term O&M commitment, requiring careful consideration of the effectiveness and necessity of each valve installation.

Items to consider include, but are not limited to:

- Number of customers which can be isolated.
- Significance of the main being protected.
- Ease of employing alternative measure such as squeeze-off.
- Relative risk of blowing gas on main to be isolated.
- Potential benefits to system maintenance.
- Potential of future construction or system up-grades.

2.1 REFERENCES:

2.2 NYCRR, Public Safety Title 16, Part 255.181

3.1 Main Valves:

Design: Ball valves, lubricated plug valves, and gate valves with internal stem screws are all acceptable designs. Gear operators should be considered in metal plug and ball valves larger than 6", and are required in valves larger than 10". Valves with full port openings must be used in pipelines designed to be pigged.

Material: Valves should be predominantly of the same material as the pipe, i.e., plastic valves in plastic systems. Polyethylene bodied valves are preferred in PE systems, and steel bodied valves are preferred in steel mains.

Pipe End Connections: The preferred method to install valves is to weld or fuse them into place based on the system type. Flanged ends are acceptable, but not preferred.

Valve Boxes: The operator of all buried valves must be accessible through a valve box. Valve boxes must be installed in a manner that will not transfer surface or highway loads to the valve or main. Smooth concrete/clay bricks shall be stacked alongside the valve from undisturbed soil up to a point just high enough to support the valve box just above the valve body. Valve boxes with rigid or fixed extensions must not be supported by, or rest on the main. Valve boxes with metal extensions cannot come in contact with the plastic main.

Valve boxes in roadways, or a road box, should have a heavy collar at least 5" deep. Valve boxes outside of the highway, or curb boxes, may utilize shallower collars.

4.1 Installations:

As a general guideline, valves should be installed to allow efficient isolation of blocks of customers in the event of a failure or 3rd party damage.

Valves should be installed on the downstream side of all branches or intersections of belt lines and/or major trunk mains. Valves are also required on lateral extensions off trunk mains if a break on the extension would require shutting down the trunk main. Valves are also required for some bridge and railroad crossings.

Valves should be installed on well compacted soil with voids around the valve filled with well compacted soil or sand. Blocking under plastic valves is not permitted. Where applicable, appropriate lengths of stick pipe rather than coiled pipe shall be fused to the valve outlets so as to protect the pipe material against excessive torsional or shearing loads when the valve is operated and from any other secondary stresses which might be exerted through the valve or valve box.

SECTION 18.00 VALVE REQUIREMENTS- SERVICE LINES

- Valve Requirements
- References
- When To Install
- Where To Install
- How To Install
- Curb Boxes

1.1 VALVE REQUIREMENTS

1.2 This section details the requirements of installing service line valves on Village owned services.

1.3 Exposed service line valves must be tamper proof and have a method for locking in the closed position.

2.1 REFERENCES

2.2 Code of Federal Regulations, Transportation Title 49, Parts 192.363 and 192.365, Subpart H, Customer Meters, Service Regulators and Service Lines.

2.3 NYCRR, Public Safety Title 16, Part 255.363, 255.365

3.1 WHEN TO INSTALL SERVICE LINE VALVES

3.2 An outside service line valve must be installed on all service lines. A valve that is an integral part of the meter set will qualify as the service line valve.

3.3 HDPE services installed without flow limiters shall have a valve installed as close as possible to the service tee.

4.1 WHERE TO INSTALL

4.2 Service line valves must be readily accessible.

4.3 Valves shall be located upstream of the regulator the operator of the valve facing away from the building to enable shut off with an extended tool in the event of an emergency.

4.4 If the service is to a building of public assembly as defined in the Operations and Maintenance Manual, the valve must be located outside of the building.

5.1 HOW TO INSTALL

5.2 Service line valves should be locked in the closed position with a barrel lock at the time of installation.

5.3 Buried service line valve commonly referred to as curb valves or curb cocks should be located as close as practicable to the property line as possible.

5.4 Buried service line valves may be marked with a line marker if the service has no other shut off valve or if the building is a building of public assembly.

6.1 CURB BOXES

6.2 Curb boxes shall be installed on each curb valve.

6.3 The curb box is to be centered over the head of the valve and the height will be adjusted to be flush with the finished grade

SECTION 19.00 TRACER WIRE

- Objectives
- References
- Tracer Wire Installation
- Test Station Boxes Damage Prevention
- Test Station Box Installation
- Test Station Construction Continuity Test

1.1 OBJECTIVES

1.2 This section details the requirement for installing tracer wire and test stations for locating PE mains and services.

1.3 A protected and locatable tracer wire box will improve the safety of the infrastructure, the safety of the public and the employee.

1.4 This process protects newly installed underground facilities from being damaged by third party work in the same general area. The underground facility shall be flagged and/or marked (Ref. 2.4 below).

2.1 REFERENCES

2.2 Code of Federal Regulations, Transportation Title 49, Part 192.

2.3 NYCRR, Public Safety Title 16, Part 255.321

2.4 Codes and Regulations of the State of New York, Public Safety Title 16, Part 753, Subchapter F – Miscellaneous, Protection of Underground Facilities.

3.1 TRACER WIRE INSTALLATION

3.2 A tracer wire shall be installed alongside (6-12 inches) but not touching plastic pipe to locate its position.

3.3 Copper (Solid) #12 wire with a tensile strength of approximately 198 # or steel core copper clad wire with a tensile strength of 370 # shall be used for all open trench main installations. Stainless steel (stranded) #10 wire with a tensile strength of approximately 1,400 # shall be used for Horizontal directional drilling installations.

3.4 Specified tracer wire is jacketed with high molecular weight polyethylene (HMW-PE). No other wire or material shall be used as tracer wire except those specified herein.

3.5 Copper and stainless steel tracer wires shall be connected in a test box using silicone filled wire nuts/lug connectors, or using the test connections provided with a test box.

3.6 Copper to stainless steel tracer wire connections shall not be subjected to any tensile loads (i.e. pullback during horizontal directional drilling).

3.7 All below grade tracer wire connections shall be protected from moisture by using silicone filled wire nuts or connectors.

3.8 Tracer wire shall be installed alongside PE pipe beyond any joint trench for location purposes.

3.9 There shall be a sufficient amount of tracer wire installed to extend 4 – 5 feet from tracer wire box. The excess tracer wire shall be coiled and left in the tracer wire box.

3.10 Service tracer wire connections to the main tracer wire shall be made with silicone filled lug connectors.

3.11 The tracer wire shall be wrapped around the service riser or clipped to the riser using a tracer wire clip.

4.1 <u>TEST STATION BOXES DAMAGE PREVENTION</u>

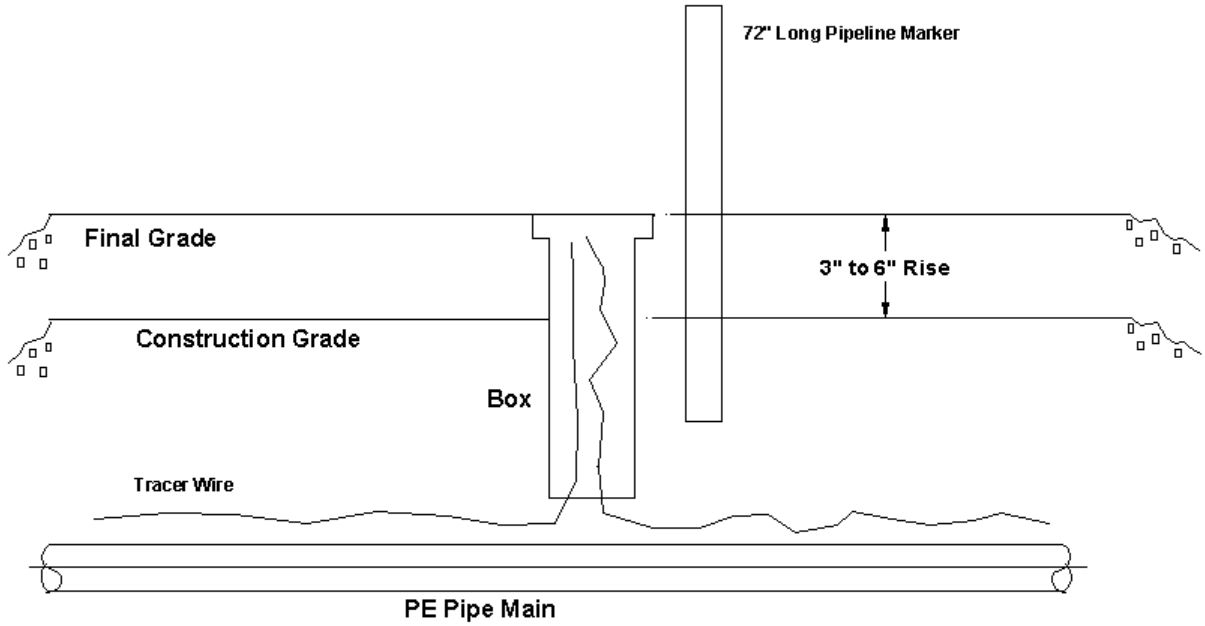
4.2 Test Stations shall be installed at tracer wire and gas main termination points to provide either a connection point to connect sections of tracer wire together or provide connection points for locating purposes. Protecting tracer wire boxes from being damaged after initial installation is essential.

4.3 To prevent tracer wire box damage during construction and to raise the level of awareness that underground facilities are present:

4.3.1 Install a pipeline marker post at tracer wire box locations.

4.3.2 Leave plastic box 6” above grade.

4.3.3 After final grade is completed, if possible leave pipeline markers and position valve box to final grade position.



Typical Test Station Installation

5.1 TEST STATION BOX INSTALLATION

5.2 There are two types of tracer wire boxes, the flush grade box and the above grade box. In most cases the flush grade box is sufficient, but depending on location a round yellow above grade plastic box can be used. The above ground box shall be utilized in rural applications for ease of locating.

5.3 Locate all tracer wire boxes behind the curb, not in the road or paved surface.

5.4 A tracer wire box shall be installed at 1,000-foot (maximum) intervals and at the end of every PE gas main.

6.1 AFTER INSTALLATION - TRACER WIRE CONTINUITY TEST

6.2 Test the post construction tracer wire. This is the responsibility of the installation crew and shall be performed by a qualified individual (s) to verify the tracer wire is continuous from given point-to-point.

6.3 Continuity test of all tracer wire shall be successful. All unsuccessful continuity tests shall be repaired and retested until 100% continuity is achieved.

SECTION 20.00 WARNING TAPE

- Warning Tape
- General
- Location
- Specification

1.1 WARNING TAPE

1.2 This section describes the general requirement to install warning tape for all new direct buried gas main and service installations.

2.1 GENERAL

2.2 Warning tape shall be installed directly above all new direct buried gas main and service installations and is not required over trenchless installations.

3.1 LOCATION

3.2 The tape shall be installed approximately 12 inches deep to insure it will be exposed by the excavator before reaching the depth of the pipe.

3.2.1 The backfilling operation will tend to push the tape to the side of the ditch, therefore, care should be taken to position the tape as close to the centerline of the pipe as possible.

3.2.2 When the main or service is located in agricultural areas that may be plowed etc, the warning tape should be located at a depth that would not be reached by the cultivating equipment.

4.1 SPECIFICATION

4.2 The marking tape will be yellow ribbon approximately 3 inches wide with the words:

"CAUTION NATURAL GAS PIPELINE BELOW"

SECTION 21.00 INSTALLATION PIPELINE MARKERS

- Line Markers
- References
- Materials
- Placement

1.1 LINE MARKERS

1.2 This section details the requirement for the placement of line markers. The installation of line markers provides added protection from third party damage and assists the crews in determining the location of Village facilities.

2.1 REFERENCES

2.2 Code of Federal Regulations, Transportation Title 49, Part 192.707, Line Markers.

2.3 NYCRR, Public Safety Title 16, Part 255.707

3.1 MATERIALS FOR LINE MARKERS

3.2 Round, triangular or flat line markers shall be utilized to mark the underground gas facilities, in addition to these line markers an above ground cathodic protection test station or a casing vent can be used as a line marker.

3.3 Pipeline markers, other than those at navigable waterways, shall have the following written legibly on a background of sharply contrasting color:

3.3.1 The word “CAUTION” followed by “NATURAL GAS PIPELINE” or “GAS PIPELINE”, with letters at least one inch high and 1/4 inch stroke.

3.3.2 The name of the operator.

3.3.3 A telephone number the operator can be reached at all times.

4.1 PLACEMENT OF PIPELINE MARKERS

4.2 Pipeline markers should be installed in such areas as property lines, hedge rows, creek crossings, road crossings, and other points of intersection along the pipeline to maintain a visual site reference along the pipeline.

4.3 Pipeline markers are required for buried distribution mains in Class 1 and 2 locations at:

4.4 Each railroad, navigable waterway, and public road crossing.

4.5 Locations where it is necessary to identify the distribution main in order to reduce the possibility of damage or interference.

4.6 Pipeline markers are not required for buried distribution mains in Class 3 or 4 locations but may be installed to alert excavators of the pipeline location.

4.7 Pipeline markers are required for buried transmission lines at:

4.8 Locations to show the placement of the transmission line including offsets.

4.9 At a distance that provides a line of sight to the next pipeline marker in both directions.

SECTION 22.00 PLASTIC BATCH NUMBERS

- Plastic Batch Numbers
- References
- Recording Plastic Batch Numbers

1.1 PLASTIC BATCH NUMBERS

1.2 This section details the requirement to record plastic batch numbers that are stenciled on all plastic pipe used in the natural gas industry.

2.1 REFERENCES

2.2 ASTM Code D2513

3.1 RECORDING PLASTIC BATCH NUMBERS

3.2 The plastic batch numbers identify the manufacturer, plant, date, shift, extrusion machine, operator, and in some cases the coil number of the pipe as it is manufactured.

3.3 By recording the batch numbers the operator has a method of identifying where specific batches of pipe have been installed in case of a recall.

3.4 The batch numbers shall be recorded on the as-built sketch. The batch numbers will also be recorded as part of the final mapping record.

SECTION 23.00 Joint Trench Installations

- Joint Trench Installations
- References
- Excavation
- Backfill
- Clearance
- Facility Location
- Customer Provided Trench – Customer Responsibilities

1.1 JOINT TRENCH INSTALLATIONS

1.2 This section pertains to the installation of gas lines in the same trench with electric cables (buried directly or within duct), telephone cables (buried directly or within duct), and television cables. Joint trenching of gas lines with sewers and water lines must be approved by the Village.
As always, good coordination between all of the joint trench parties (electric, gas, cable television (CATV), telephone, and the customer or contractor is essential if cost savings associated with joint trenching are to be maximized.

2.1 REFERENCES

2.2 Code of Federal Regulations, Transportation Title 49, Part 192, Subpart E and F.

2.3 NYCRR, Public Safety Title 16, Part 255 various sections.

2.4 Fuel Gas Code of New York State and ANSI Z223.1-1996, Part 3, Gas Piping Installation, 3.1.3.

2.5 NFPA 54

3.1 EXCAVATION

3.2 Trench Width - The trench must be wide enough to allow a minimum of twelve (12) inch of horizontal separation between gas lines and any other utility. The gas lines shall be located on the side of the trench that is closest to the house.

3.3 Trench Depth - The normal cover directly over the pipe is to be at least twenty four (24) inches. The final grade over the pipeline is determined from the subdivision maps and the installation depth is shown on the gas proposal.

3.4 Trench Bottom (Bedding) - The trench bottom shall be reasonably level and free of all rock and other sharp objects. If the facilities are to be installed in either a rock excavation or soil that may damage it, a bedding of three inches of small particle-size soil shall be placed in the trench prior to the installation of the facilities. As a rule, small particle-size material shall be considered as material that is either rounded and contains particles ¾ of an inch in diameter or sand.

3.5 Trench Walls - Trench walls will be as vertical as possible.

3.6 Trench Obstructions - The Contractor is responsible for obtaining the location of all underground pipe, ducts and obstructions from the owner of the facility before excavation of a trench. He is responsible for making certain that no damage is incurred because of his excavation.

3.7 No tree roots shall be cut without permission of the governing authorities of the right of way (State, County, City, Town) or, on private property, the property owner.

3.8 Excavation location changes are made only with permission of authorized representatives of those utilities involved.

3.9 Trench (Padding) – Refers to the area in the trench above the facilities. Small particle sized soil shall be placed over the facilities for a depth of six (6) inches. Care should be taken not to pierce the sand layer with stones and other sharp objects.

4.1 BACKFILL

4.2 Refers to the area six inches above the facilities to grade. No rocks larger than approximately four (4) inches in any dimension will be allowed Backfill trench with clean backfill material, until the compacted backfill is twelve (12) inches over all utilities. Clumps of frozen material shall be broken up and pulverized prior to backfill.

4.3 Method - The contractor will backfill all excavations to the satisfaction of the property owners, and all involved utility agencies.

5.1 CLEARANCE

5.2 Construct the trench to provide twelve (12) inches clearance from any existing or proposed underground structure such as sewers or water lines. No utility should be installed above the horizontal plane of the gas line. It is preferred that all utilities be installed at the same depth (Horizontal Construction).

5.3 Electric lines should be installed below gas facilities at crossings. Vertical separation between electric and gas facilities shall be as follows:

6-inch minimum for gas main or service.

5.4 If gas services are installed in a joint trench the gas facilities should be installed to the right side (as facing the house) of pad-mounted equipment. A 12-inch separation should be maintained between gas facilities and the concrete foundation for pad-mount equipment.

5.5 If gas services are installed in a joint trench, the electric meter shall be installed on the front corner on the end of the house. The gas meter shall be installed near the electric meter, but sufficiently toward the rear of the house to: 1) maintain a 12-inch minimum horizontal separation between the gas regulator and the electric meter cabinet, and 2) maintain a 6-inch minimum horizontal separation between any gas piping and the electric meter cabinet.

5.6 The gas regulator vent shall be located at least 18 inches away from any opening into the structure. Where practical, the gas regulator should not be located under a window capable of being opened.

6.1 FACILITY LOCATION

6.2 Facility location is preferred to be on private property. Installation on highway right of way can be an alternate location as conditions dictate.

7.1 CUSTOMER PROVIDED TRENCH – CUSTOMER RESPONSIBILITIES

7.2 The customer will be required to coordinate the installation with other utilities (electric, gas, cable television (CATV), telephone).

7.3 Provide easements as required.

7.4 Provide a clear path for utilities, graded within six (6) inches of final grade.

7.5 Request and schedule coordinating meeting with all utilities prior to construction.

7.6 Provide the Village five (5) working days' notice to schedule the installation.

7.7 Call Dig Safe New York at 1-800-962-7962 for utility stake out at least 48 hours but not more than 10 days prior to the anticipated start of excavating (some utilities may not belong to Dig Safe and will need to be notified individually)

NOTES:

1. The trench shall be dug one day prior to installation of all utilities.
2. The Village will inspect and approve the trench the day before installation.
3. The Village will install any road crossings as necessary.
4. The Village will witness the bedding/padding of utilities when conduit is not

SECTION 24.00 BYPASSING

- Bypassing
- References
- General

1.1 BYPASSING

1.2 This section is written to provide a guideline for personnel when bypassing and tying in gas mains. Also included in this section is the need and proper placement of pressure indicating gauge locations for safely and expeditiously completing a bypass.

2.1 REFERENCES

2.2 NYCRR, Public Safety Title 16, Part 255.

2.3 American Society of Mechanical Engineering (ASME), Gas Transmission and Distribution Piping Systems, ASME B31.8 - 1999 Edition.

2.4 Department of Transportation (DOT), Part 192, 49 CFR.

3.1 GENERAL

3.2 The bypass shall be modeled with expected pressure drops and conveyed to the field employees as details on construction drawings or through written procedural steps.

3.3 There are other manufacturer's fittings that can be used for bypassing such as mechanical service tees without flow limiter and high volume electrofusion tees.

3.4 All bypass and stopping operations shall be performed using pressure indicating gauges to determine both upstream and downstream pressures. The gauges shall be monitored during the operation to verify the pressure and any abnormal operating condition that may occur due to the procedure.

3.5 The pressures shall be monitored the entire time the bypass is being used.

3.6 The pressure indicating gauges shall be installed as close as possible to the work location and within the line of site of the work. Radio or telephone communication may also be used if needed. The indicating gauges may be installed in the following locations:

- service tee connections installed for the bypass operation
- house meter set
- terminal gauges
- or station chart recorders.

3.7 The placement and usage of gauge locations shall be documented on the construction drawings or in the written procedure.

SECTION 25.00 TAPPING GAS SERVICES

- Tapping
- References
- General

1.1 TAPPING GAS SERVICES

1.2 This section details the requirements of tapping gas services and proper installation location for service tees for plastic.

2.1 REFERENCES

2.2 NYCRR, Public Safety Title 16, Part 255.367

2.3 American Society of Mechanical Engineering (ASME), Gas Transmission and Distribution Piping Systems, ASME B31.8 - 1999 Edition.

2.4 Department of Transportation (DOT), Part 192, 49 CFR.

3.1 GENERAL

3.2 Self -Tapping tees are the primary service connection for gas services. Only qualified employees shall perform the installation/tapping operation.

3.2.1 Self-tapping mechanical tees are available for high density plastic mains in main sizes 2" to 10" and outlet sizes from 1/2" & 1". Outlet sizes greater than 1 ¼" require the use of electrofusion high volume tapping tees.

3.3 Each service line connection to a main must be located at the top of the main between the 315˚ and 45˚ or between 10 and 2 positions. Installation angles greater than this may produce difficulty in proper operation of the flow - limiting device if so equipped. Side tap connections are not recommended due to the possibility of moisture or other liquids being carried from the main to service line.

SECTION 26.00 PIPELINE TEST REQUIREMENTS

- Scope
- References
- Acronyms
- Definitions
- Responsibilities
- General
- Testing Steel and Plastic Pipelines Operating at Less than 125PSIG.
- Pressure Testing Steel Pipelines Operating at 125 PSIG or Above
- Test Requirements for Steel and Plastic Service Lines Operating at Less Than 125 PSIG
- Test Requirements For Reinstating Service Lines

1.1 SCOPE

1.2 This section covers the pressure test requirements for distribution and transmission main and service pipelines. This procedure shall be used to verify system integrity and establish the maximum allowable operating pressure (MAOP) prior to placing in service.

2.1 REFERENCES

2.2 NYCRR Public Safety Title 16 Parts 255.505, 255.507, 255.511, 255.725

3.1 ACRONYMS

3.2 Maximum Allowable Operating Pressure (MAOP)

3.3 Pounds per Square Inch Gauge (psig)

3.4 New York State Department of Public Service (DPS)

3.5 Specified Minimum Yield Strength (SMYS)

3.6 Combustible Gas Indicator (CGI)

3.7 Flame Ionization (FI)

4.1 DEFINITIONS

4.2 Stabilization: The point in time when the test pressure will not drop below the minimum required test pressure at any time during a test.

4.3 Time Off: The time at which the pressure recording gauge or pressure indicating gauge is removed and the pressure test officially ends.

4.4 Time On: The time at which the test pressure has stabilized, the pressure recording gauge or pressure indicating gauge is installed and the pressure test officially begins.

4.5 Disconnect: To physically separate a service line at the main or any location along its entire length.

4.6 Reinstating: Reconnecting a service line that has been disconnected. When a service line is reinstated, a pressure test is required.

5.1 RESPONSIBILITIES

5.2 Gas Operator is responsible for:

5.2.1 Providing the DPS with the required five days verbal notice prior to pressure testing pipelines operating at 125 psig or above.

5.2.2 Performing the pressure tests and recording the results.

5.2.3 Ensuring all gauges are calibrated.

5.2.4 Providing the DPS with a signed copy of the completed pressure test chart for pipelines operating at 125 psig or above.

6.1 GENERAL

6.2 When performing a pressure test, the following information shall be included on the recording chart or the as-built sketch (if a pressure indicating gauge is used):

6.2.1 Signature of employee and employee number

6.2.2 Time On

6.2.3 Date On

6.2.4 Time Off

6.2.5 Date Off

6.2.6 Test duration, if a pressure indicating gauge is used

6.2.7 Test medium (water, inert gas, air)

6.2.8 Description of the project or section of the project

7.1 TESTING STEEL AND PLASTIC PIPELINES OPERATING AT LESS THAN125 PSIG

The test pressure shall be 90 psig or 1.5 times the MAOP, whichever is greater.

7.1 **The test pressure for plastic shall never exceed 3 times the design pressure**.

7.2 The test duration shall be at least one hour after stabilization.

7.4 The test medium shall be air, inert gas, or water. During the test, the temperature of the plastic pipe shall not exceed the temperature at which the material's long-term hydrostatic strength has been determined, or 100ºF, whichever is greater.

7.5 A calibrated indicating gauge or pressure recording gauge that will indicate increments of two psig or less shall be attached to the test section.

7.5 For tests on short sections (100 feet or less) of plastic pipe and tie-in sections where all joints, and/or fittings are exposed, a soap test is acceptable at line pressure.

The entire pipe length must be soap tested. Natural gas may be used as the test medium at the maximum pressure available in the distribution system at the time of the test.

8.1 PRESSURE TESTING STEEL PIPELINES OPERATING AT 125 PSIG OR ABOVE

8.2 The test pressure shall be 90 percent of the SMYS or 1.5 times the MAOP, whichever is less.

8.1 The test medium shall be air, inert gas, or water. If the pipeline will operate above 20 percent SMYS in any location or operate at 125 psig or above in a Class 4 location, the medium must be water unless there are no buildings intended for human occupancy within 300 feet of the pipeline facilities being tested. Prior approval must be granted by the DPS to use air or inert gas.

8.2 The test duration shall be 12 hours after the pressure has stabilized.

8.2.1 The duration of the test may be reduced to four hours, following stabilization, for short lengths of pipe (including tie-in sections) which have not been backfilled and the entire circumference can be examined visually for leakage.

8.2.2 For safety reasons it is preferable to conduct these tests hydrostatically. However, an inert gas may be used in situations where hydrostatic testing is not practicable.

8.3 A pressure recording gauge, calibrated in accordance with procedure for (Calibration of Pressure Indicating Gauges, Recording Gauges and RTUs), with increments of five psig or less, where practicable, shall be attached to

the test section.

8.3.1 The pressure recording gauge must be calibrated hourly for the first and last two hours of the test. Calibration shall be performed using a dead weight tester, or electronic pressure recording gauge. All data shall be documented on the Pressure Test Data Sheet

8.3.2 In addition, readings for pressure and temperature shall also be observed and documented every hour on Form# VOH 401 Pressure Test Data Sheet.

8.4 Flanged joints and fittings may be subjected to system hydrostatic tests at pressures not to exceed the following:

8.4.1 150# Class – 450 psig
8.4.2 300# Class – 1125 psig
8.4.3 400# Class – 1510 psig
8.4.4 600# Class – 2225 psig

8.5 A copy of the completed Pressure Test Data Sheet and pressure recording charts shall be maintained in the project.

9.1 TEST REQUIREMENTS FOR STEEL AND PLASTIC SERVICE LINES OPERATING AT LESS THAN 125 PSIG

9.2 Test requirements:

9.1

Pipe Material	Pipe Size	Test Pressure	Test Duration
Steel or Plastic	2” and smaller	90 psig or 1.5 X MAOP (whichever is greater)	15 minutes
Steel or Plastic	Greater than 2”	90 psig or 1.5 X MAOP (whichever is greater)	30 minutes

9.3 The test medium shall be air. During the test, the temperature of the plastic pipe shall not exceed 100ºF.

9.4 A calibrated pressure indicating gauge shall be attached to the test section that will indicate:

9.4.1 Increments of five psig or less for services operating at 100 psig or greater; or
9.4.2 That any loss of pressure is readily detected for services

operating less than 100 psig.

9.5 The limits of the test shall be from the main to the service line valve immediately upstream of the meter or regulator for both inside and outside sets.

9.6 The service line connection to the main does not need to be included in these tests if it is not practical. However, the main connection shall be leak tested at operating pressure when placed into service.

9.6.1 If a service tee is not removed or a new service tee is installed over an existing tap hole as a result of a service replacement, a soap test is required for each connection and tie in piece that is not subjected to a pressure test.

10.1 TEST REQUIREMENTS FOR REINSTATING SERVICE LINES

10.2 All service lines operating at pressures less than 125 psig that have been disconnected as a result of third party damage shall be air tested from the point of disconnect to the house end as described in section 9.1 of this section.

10.2.1 All final connections shall be soap tested at line pressure. The point of disconnect to the main shall be evaluated for leakage by surveying with a FI unit or CGI after repair. If the ground is saturated with natural gas, it shall be surveyed daily until zero percent gas in air readings are obtained.

10.3 Service lines disconnected from the source of supply for any length of time shall be tested in accordance with the following steps prior to reinstatement. The test limits shall be from the main or point of disconnect to the service line valve immediately upstream of the meter or regulator.

10.3.1 If the MAOP is less than or equal to 20 psig, the test pressure shall be three psig or three times the MAOP, whichever is greater.

10.3.2 If the MAOP is more than 20 psig up to and including 60 psig, the test pressure shall be 90 psig.

10.3.3 If the MAOP is greater than 60 psig, the test pressure shall be 1.5 times the MAOP.

10.3.4 The test duration for steps 10.3.1, 10.3.2 and 10.3.3 shall be 15 minutes.

10.3.4.1 **For services larger than two inches to be operated at pressures less than 125 psig refer to the table in section 9 of this procedure.**

10.3.5 The test medium shall be inert gas or air.

10.3.6 The test shall be conducted with a calibrated pressure indicating gauge.

SECTION 27.00 PURGING MAINS AND SERVICES

- Scope
- Reference
- General Guidelines
- Purging Services Lines
- Purging Mains

1.1 **PURGING OF MAINS AND SERVICES**

2.1 SCOPE: This section covers proper purging methods of service lines and mains. Purge is the act of removing the content of pipe and displacing it with another gas.

3.1 REFERENCE:

3.2 NYCRR Public Safety Title 16 Parts Part 255.629, 255.727, 255.751,
3.3 AGA Purging Principles and Practices.

4.1 GENERAL GUIDELINES

4.2 New gas mains, services, extensions, and tie-ins shall be purged of all air before being placed in service. All mains and services to be abandoned shall be disconnected from all sources of gas, completely purged of natural gas.

4.3 New gas mains and services shall only be purged after successfully completing a pressure leak test. Only a qualified person may perform purging operations.

4.4 A minimum of two people shall be present during the purging of a main or service; one to control the flow of the purging gas at the source and the other to control the flow where the purging gas enters the atmosphere.

4.5 New or replacement gas mains shall be tied into the system prior to purging operations. Sources of ignition shall be eliminated in the area of the purging operation. Plastic pipe shall not be used for purging transitions to steel risers and precautions to eliminate static electricity at squeeze locations shall be utilized.

4.6 When using air to purge a main or service to be cut dead, no combustible gas mixture shall be present in the gas main or service following the purging operation.

4.7 Avoid the public's presence in the area of the purging operation.

5.1 PURGING SERVICE LINES

5.2 Requirements for purging lines to initiate or restore service are as follows:

5.2.1 An inert gas (nitrogen or carbon dioxide) purge is not required for service lines.

5.2.2 The service line valve should be operated before purging to ensure that it works properly and it can be closed.

5.2.3 Precautions shall be taken to ensure that natural gas is not being vented into a building or closed environment.

5.2.4 Any pipe or fittings being used to direct purging gas either “out of” or “away from” a closed environment shall be gas tight mechanical fittings.

5.2.5 Check for 100% gas using a calibrated Combustible Gas indicator (CGI) at a point where the purging gas enters the atmosphere.

5.2.6 Upon completion of the purge and closing of the service line valve any exposed pipe or fittings shall be checked for leakage.

5.2.7 After a new service purge is completed and the meter is not going to be installed immediately, the exposed service line valve shall be plugged and locked to prevent unauthorized use.

5.2.8 When purging service lines that will be abandoned, the hose or piping can be connected to either end of the service. Check for 0% gas using a calibrated CGI.

6.1 PURGING MAINS

6.2 Purging of gas mains shall be conducted through properly sized metallic piping constructed to extend 7 feet above grade. The minimum size vent shall be 1-inch nominal diameter.

6.3 All vent piping shall be grounded to dissipate any static charges developed during the purge.

6.4 Only one purge point shall be open at a time.

6.5 For activation of new mains, check for 100% gas using a calibrated Combustible Gas Indicator (CGI) at a point where the purging gas enters the atmosphere.

6.6 For abandoning of mains, check for 0% gas using a calibrated Combustible Gas Indicator (CGI) at a point where the purging gas enters the atmosphere. If after using the required amount of nitrogen, the gas is still not a 0%, air may be used to complete the purge.

6.7 Purging mains less than 6 inches in diameter

6.7.1 Gas mains less than 6" do not require an inert gas (nitrogen or carbon dioxide) purge.

6.8 Purging 6 inch mains and greater in diameter.

6.8.1 Short sections of gas mains 6 inch or greater in diameter and less than 40 cubic feet, may not require an inert gas purge at the discretion of the Gas Supervisor.

6.8.2 All other gas mains 6 inch or greater in diameter shall be purged with an inert gas (nitrogen or carbon dioxide) when activating or abandoning in place.

6.9 Refer to Table 1 below for the required amount of inert gas to purge by completely filling the volume with an inert gas.

Table 1 - Required Inert Gas Amount

Nominal Pipe Size	Volume of Inert Gas Required per 100 ft of Pipe Length
6 inch	30 cubic feet
8 inch	55 cubic feet
10 inch	90 cubic feet
12 inch	120 cubic feet

6.10 When it is impractical to completely fill the pipeline with an inert gas due to the pipelines length, a slug purge may be performed. This reduces the amount of nitrogen required to safely purge the line.

SECTION 28.00 CASINGS

- Casings
- Reference
- General Information for Casings

1.1 CASINGS

1.2 This section describes the general installation requirements for casings. Refer to specific design for installation details.

2.1 REFERENCES

2.2 Code of Federal Regulations, Transportation Title 49, Part 192.323, Casing.

2.3 NYCRR Public Safety Title 16 Part 255.323.

3.1 GENERAL INFORMATION FOR CASINGS

3.2 Casing Pipe – The casing shall be two pipe sizes larger than the carrier pipe

3.3 Place a casing insulator within six inches of the casing ends and space casing insulators evenly every 8 to 10 feet for plastic carrier pipe. Insulators should be adequately tightened to prevent slippage when inserting pipe into casing.

3.4 Center and insert carrier pipe through casing.

3.5 Clean ends of casing and carrier pipe in preparation of link seal installation. The link seals provide an end seal at the casing ends that protect the casing from debris.

3.6 Install end seals at both ends of the casing.

SECTION 29.00 TERMINAL GAUGE AND REMOTE RTU INSTALLATION

- Terminal Gauge & Remote RTU Installation
- References
- Requirements
- Design, Material, Fabrication, Installation
- Terminal Gauge Installation

1.1 TERMINAL GAUGE & REMOTE RTU INSTALLATION

1.2 This section describes in detail the materials required for a Terminal Gauge and a Remote Transmitting Unit (RTU) installation. This includes design, materials, fabrication and installation.

1.3 Pressure sensing Terminal Gauges and Remote RTU are used throughout the distribution system to measure and record gas system pressure fluctuations.

1.4 The Terminal Gauge records the pressure on a circular paper chart that is changed on predetermined schedule either weekly or monthly. The charts are reviewed to determine operating conditions and make pressure changes on a month by month basis.

1.5 The RTU continually transmits the measured pressure electronically to the gas SCADA where a dispatcher can control and/or observe the system pressures.

1.6 The recorded readings for both types of monitoring gauges are used to determine possible system problems or to verify system node maps for accuracy.

2.1 REFERENCES

2.2 Code of Federal Regulations, Transportation Title 49, Part 192.51, Subpart B-Materials.

2.3 NYCRR Public Safety Title 16 Part 255.203

2.4 American Society of Mechanical Engineering (ASME), Gas Transmission and Distribution Piping Systems, ASME B31.8 - 1999 Edition, section 848.

3.1 REQUIREMENTS

3.2 On Distribution Systems greater than 12 inches water column pressure, Gas Operations will determine the necessity of installing a Terminal Gauge or Remote RTU.

4.1 DESIGN, MATERIAL, FABRICATION, INSTALLATION

4.2 Fabrication shall be consistent with normal gas construction requirements.

4.3 Connection to gas main shall be similar to that of a service. Installation shall

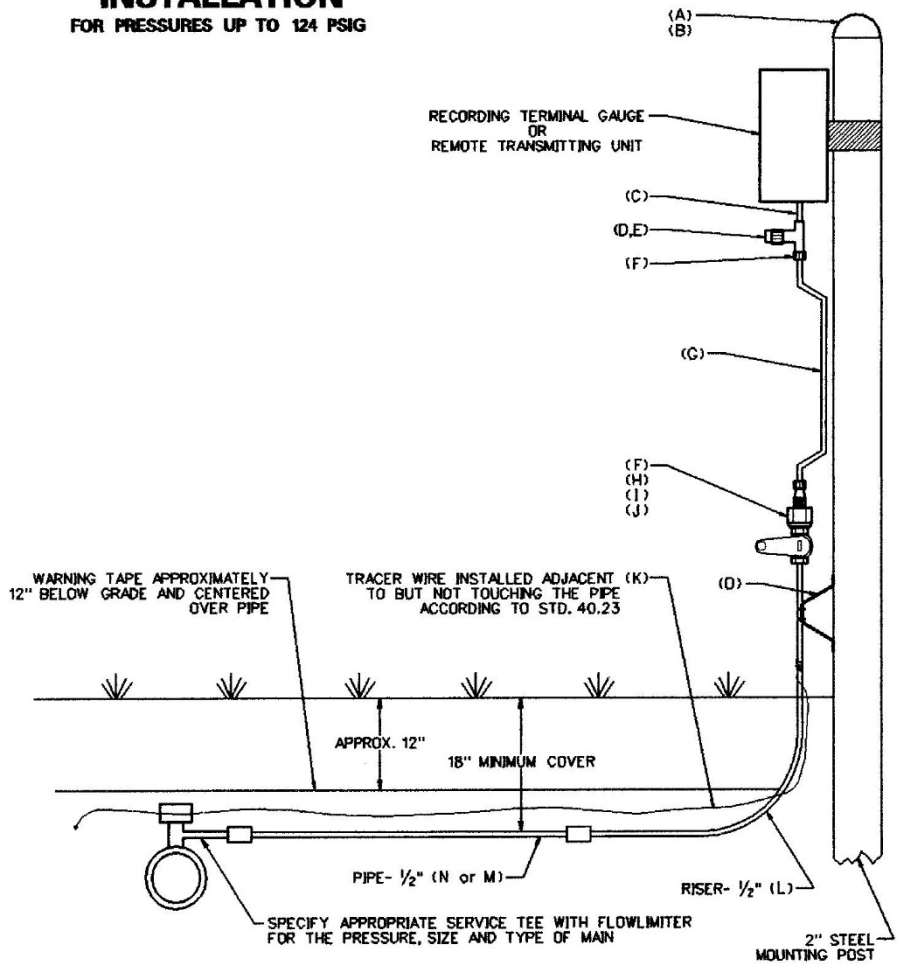
be performed per the appropriate specification main material and pressures.

Item	Quantity	Description		
A	1	Cap, Weld, 2 “		
B	1	Pipe, Bare 2”		
C	1	Nipple, Thread, Black, ¼” x 3”		
D	1	Tee, thread, Black ¼”		
E	1	Plug, Threaded, Black, ¼”		
F	2	Adaptor, ¼” Pipe x 3/8” Tube		
G	**	Tubing, Stainless, 3/8”		
H	1	Nipple, Threaded, Black, ¾” x 2”		
I	1	Coupling, Threaded, Black, Reducing, ¾” x ¼”		
J	1	Valve, Lock wing, ¾”		
K	**	Wire, Tracer, #12 Solid		
L	1	Riser, ½” MDPE x ¾” IPS For Pressures Up To 124 PSIG		
M	***	Pipe, MDPE For Pressures Up To 60 PSIG		
N	***	Pipe, HDPE For Pressures Up To 124 PSIG		
O	1	Bracket , Service Riser, Adjustable ½” – 2”		

NOTES
* - Swagelok Part # SS-600-1-4, Parker Part # 6-4-FBZ-SS
** - Quantity as needed
*** - As required to meet pressure requirements

TERMINAL GAUGE INSTALLATION

FOR PRESSURES UP TO 124 PSIG



INSTALLATION GUIDELINES:

1) IF POSSIBLE, POSITION INSTALLATION OFF THE ROAD IN AN INCONSPICUOUS LOCATION. PROTECTED FROM TRAFFIC AND NOT ANNOYING THE CUSTOMER BY IT'S LOCATION.

2) ALWAYS USE SERVICE TEES WITH FLOW LIMITERS FOR MEDIUM PRESSURE APPLICATIONS.

3) ORDER CHART GAUGE WITH EITHER THE 8" OR 12" CHART, 31 DAY CLOCK, SOLID FRONT DOOR, WITH LOCKING HASP, PAINTED FOREST GREEN, 2" POST MOUNT AND BLUE PEN. THE PRESSURE RANGE MUST BE SPECIFIED. THE CHART SHOULD OPERATE IN THE MIDDLE OF THE RANGE. EXAMPLE: 45# SYSTEM ORDER 0-75# RECORDER, 60# SYSTEM ORDER 0-150# RECORDER 124# SYSTEM ORDER 0-150# RECORDER.

4) THE GAUGE SHALL BE INSTALLED AT APPROXIMATELY AVERAGE EYE LEVEL OR CENTERED AT ABOUT 5'6".

5) THE MOUNTING POST SHALL BE SET AT A DEPTH BELOW THE ANTICIPATED FROST LEVEL.

6) THE TAP CONNECTION FOR THE TERMINAL GAUGE SHOULD BE LOCATED AT THE MAIN LINE ONLY. THE TAP SHOULD NOT BE OFF CUSTOMERS SERVICE LINES DUE TO PRESSURE DROP ON SERVICE LINE THAT WILL RESULT IN INACCURATE PRESSURE READINGS.

SECTION 30.0 METERS – GENERAL

- General
- References
- Piping
- Outside Installations
- Meter Protection
- Load Diversification – Medium Pressure Mains
- Meter Swivels
- Meter Bypass Installation
- Special Regulations Governing Schools

1.1 GENERAL

1.2 This section provides general information to be used for gas meter set details, load diversification standards for low pressure delivery from medium pressure gas mains, and details the requirements for piping, piping components, and meter protection of various meter settings.

1.2 Any preliminary load over 5 MCFH on a medium pressure distribution system shall be reviewed for impact to service or main capacity.

2.1 REFERENCES

2.2 NYCRR Public Safety Title 16 Parts 255.351 to 255.359

2.3 National Fuel Gas Code (National Fire Protection Association, NFPA-54 and Z223.1-1996).

2.4 New York State Fuel Gas Code. NYS Department of State Division of Code Enforcement and Administration

2.5 New York State Education Department, Manual of Planning Standards, 1998 edition, Sections S409, S709, &. S710.

2.6 ASME Code for Pressure Piping, ASME B31.3-2002, Sec 304.3 Branch Connection.

3.1 PIPING

3.2 All meter and regulator installations shall be constructed from steel pipe using threaded, welded, flanged or compression connections. Only approved pipe and fittings may be used.

3.3 Threaded connections will be limited to 2” and smaller. However, rebuilds may require threaded fittings larger than 2”.

3.4 Outside sets shall be painted ASA#49 gray, equivalent (dark machinery gray) or thermally sprayed aluminum (TSA). Meters, regulators, overpressure protection and flange faces are not to be painted. Aluminum piping may be used only for vent stacks.

3.5 Copper piping may be used only for vent lines on regulators or overpressure protection. Plastic pipe shall not be used for vent piping.

4.1 OUTSIDE INSTALLATIONS

4.2 All meter and regulator sets shall be installed outside.

4.3 All purchased meters must be tested to 10psig minimum.

5.1 METER PROTECTION

5.2 Meters should be located in the safest possible location to minimize physical damage. Physical damage includes but is not limited to vehicular traffic, possibility of vandalism, and exposure to snow, ice or water runoff from roofs, etc. In cases where no hazards exist protection is not necessary.

5.3 Any meter or regulator set located within three feet of any driven surface, paved or unpaved, requires barricades. This includes installations perpendicular to the driven surface as well as those that are parallel. Installations beyond the three foot rule may have barricades when considered necessary.

5.4 Any commercial, industrial or fixed factor set where the possibility of vandalism could occur and no temperature and/or pressure corrector is used shall be, at a minimum, installed within a chain link fence. The chain link fence shall be paid for and maintained by the customer.

5.5 All meter sets with temperature and/or pressure correctors shall be installed in a building to protect the large capital investment and electronic equipment. A building may be employed around any set to enhance aesthetics or provide a greater level of protection when deemed necessary. All meter buildings will be constructed to Village standards and shall be paid for and maintained by the customer.

6.1 LOAD DIVERSIFICATION – MEDIUM PRESSURE MAINS

6.2 When providing gas service to customers served from medium pressure gas mains, the customer's total connected loads may be diversified based on type of load or load usage.

7.1 METER SWIVELS

7.6 The standard residential meter swivel for a prefab meter set is an offset (20 LT)

7.7 The same meter bar is used for 250, 425 and 630 meters.

7.4 When the gas load for a residential or small commercial customer exceeds the capacity of the standard 250 style meter. The offset swivels are needed due to the wider connection spacing of the 425 and 630 style meters.

8.1 METER BYPASS INSTALLATION

8.2 A meter bypass may be required when a customer's service can NOT be interrupted. A meter bypass would allow exchange of the meter as required by the mandated meter exchange program while providing continuous, albeit short term unmetered gas to the customer.

8.3 Include a bypass on the meter set to accommodate customers involved in:
- Critical manufacturing heating operation (i.e. - glass, heat treating)
- Critical care facilities (i.e. - Hospitals, nursing or group homes)
- Large load customers.

9.1 SPECIAL REGULATIONS GOVERNING SCHOOLS

9.2 Meters, regulators, and over pressure relief devices shall be protected by either being located within a separate meter building/room or fenced area adjacent to the school building.

9.3 The maximum delivery pressure into a boiler room shall be limited to 2 PSIG.

9.4 The maximum delivery pressure directly into any other school area shall be a maximum of ½ PSIG.

9.5 Piping after Village owned metering and regulating equipment owned by the school, located inside and larger than 3 inches must be welded construction.

9.6 Pressure testing (required by school's contractor) must comply with the following:

9.6.1 Piping with a working pressure up to 12 inches water column is to be tested with air or inert gas for a minimum of 1 hour at 15 PSIG.

9.6.2 Piping with a working pressure above 12 inches water column is to be tested with air or inert gas for a minimum of 1 hour at ½ times the working pressure or a minimum of 50 PSIG.

9.6.3 Pressure tests must be made in the presence of the architect, engineer, or their representative.

SECTION 31.00 RESIDENTIAL METER SETS

- Residential Sets
- References
- Meters
- Regulators
- Drawings of Residential Sets

1.1 RESIDENTIAL SETS

1.2 This section details the requirements of residential meter sets.

2.1 REFERENCES

2.2 NYCRR Public Safety Title 16 Parts 255.351 to 255.359.

2.3 National Fuel Gas Code (National Fire Protection Association, NFPA-54 and Z223.1-1996).

2.5 New York State Fuel Gas Code. NYS Department of State Division of Code Enforcement and Administration

3.1 METERS

3.2 All new meter sets will be installed outside of the building being served and located to minimize exposure to snow, ice, or water runoff from roofs, including locations where snow is piled when practicable. All meter and regulator sets shall be installed outside. Under some circumstances a meter may be installed inside. All inside sets shall have outside shutoff valves.

3.3 Gas meters must have a minimum separation of 3 feet from sources of ignition. Electric meters are not considered sources of ignition.

3.4 All new meter installations must be insulated at the inlet and outlet of the Villages' metering/regulating facilities. In most cases, this will be accomplished by the use of an insulating union service valve and an insulating union on the outlet of the meter bar.

3.5 If the customer wishes to install some type of meter cover, it should be constructed so Village work can be accomplished without hindrance.

3.6 Corrugated stainless steel tubing (CSST).

3.6.1 Single meter sets. CSST shall be located on the building interior only. An approved CSST wall flange or black iron pipe shall be used through the exterior wall and hard piped to the meter set to provide adequate support.

3.6.2 Multiple meter sets. CSST may be used on the exterior of the building (between ground and a height of 6') in an exposed condition provided the CSST is protected inside a conduit and a wall flange or black iron pipe is used for the wall penetration.

3.6.3 CSST requires manufacturer's qualified installers, specific guidelines apply to

these installations such as grounding details, refer to manufacturer's instructions.

4.1 REGULATORS

4.2 For each installation, operating personnel will decide on the location of the vent terminus and the vent size considering customer safety, aesthetics, and economics. **In all cases the regulator diaphragm vent shall be located 18 inches above anticipated final grade.** The bottom of the meter shall not be in contact with the ground. In areas subject to flooding the vent opening should be raised up to 10 feet. Vent extensions over 10 feet must be properly sized for adequate relief capacity.

4.3 Internal relief regulators should be located outside on the riser. If for some reason the service termination must be inside, an internal relief regulator can be located inside if the vent is piped to terminate outside.

4.4 The vent terminus for both the inside and outside locations shall have the vent opening pointing toward the ground, be covered with an insect-proof cap, be at least 18" above the finished grade, be 18" from any building opening and be placed where the vent cannot create a hazard.

4.5 If the customer installs an enclosure, any vents shall terminate outside the enclosure.

4.6 Inspection of all residential regulators shall be done in accordance with the Gas Operating and Maintenance Procedures Manual.

4.7 Customers that require service pressure greater than 7" (1/4psig) will require Meter and regulator sets designed to the specific application.

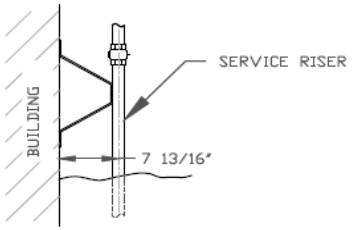
5.1 DRAWINGS OF RESIDENTIAL SETS

M-101 Pre-Fab Meter Set – MP
(¾" x 1") and (1" x 1")

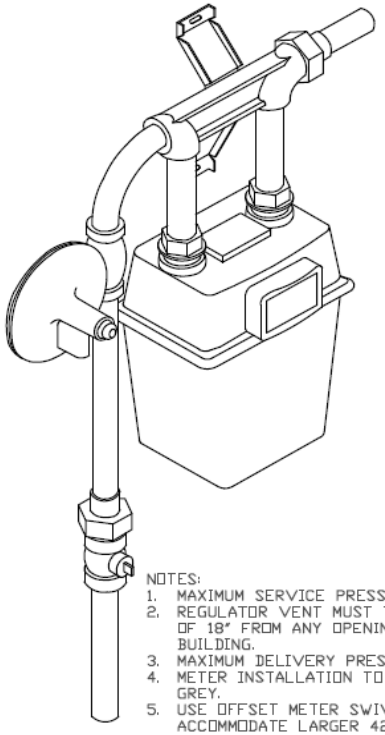
M-102 Pre-Fab Two Meter Manifold – MP
(3/4"x1") and (1"x1")

M-103 Pre-Fab Three Meter Manifold – MP
(3/4"x1") and (1"x1")

M-104 Pre-Fab Four Meter Manifold – MP
(3/4"x1") and (1"x1")



SIDE VIEW



NOTES:
1. MAXIMUM SERVICE PRESSURE 100 PSIG.
2. REGULATOR VENT MUST TERMINATE A MINIMUM OF 18" FROM ANY OPENING INTO THE BUILDING.
3. MAXIMUM DELIVERY PRESSURE 6.5" W.C..
4. METER INSTALLATION TO BE PAINTED ASA 49 GREY.
5. USE OFFSET METER SWIVELS TO ACCOMMODATE LARGER 425 & 630 METERS.

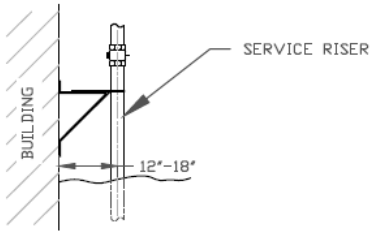
SIZE
INLET 3/4" IPS, OUTLET 1" IPS
INLET 1" IPS, OUTLET 1" IPS
METER BRACKET

DIVERSIFIED METER CAPACITY			
	AC-250	AC-425	AC-630
6.5" H20 MAX.	0-350 SCFH	0-540 SCFH	0-900 SCFH

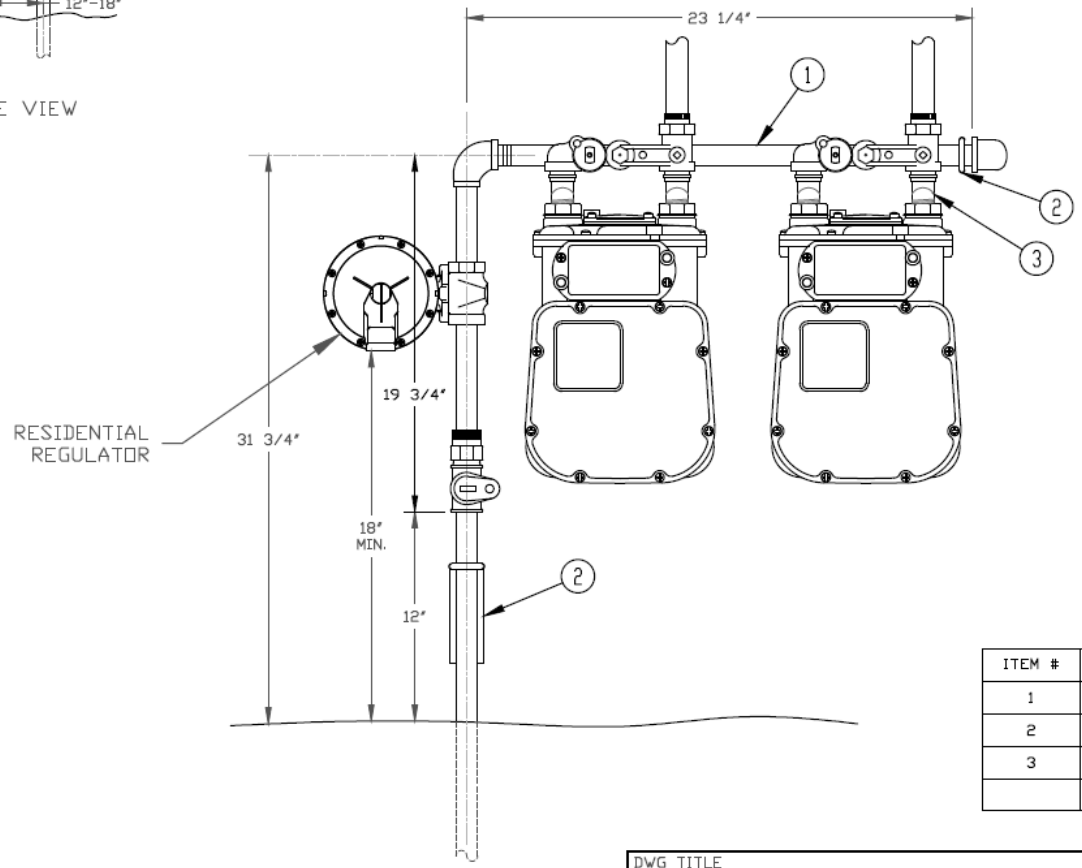
DWG TITLE
MEDIUM PRESSURE, RESIDENTIAL PREFAB SINGLE METER

VILLAGE OF HAMILTON
SCALE: NTS
DRAWN BY: INTEGRITY ENGINEERING

DWG NO.
M-101



SIDE VIEW



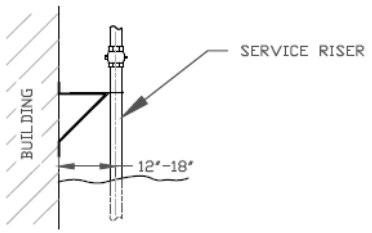
NOTES:
1. MAXIMUM SERVICE PRESSURE 100 PSIG.
2. REGULATOR VENT MUST TERMINATE A MINIMUM OF 18" FROM ANY OPENING INTO THE BUILDING.
3. METER INSTALLATION TO BE PAINTED ASA 49 GREY.
4. OVERALL DIMENSIONS ARE REFERENCE ONLY.
5. IF ITEM 2 CANNOT BE ATTACHED TO THE WALL IT MAY BE ATTACHED TO A POST.
6. SET REGULATOR AT 6.5" W.C.
7. USE OFFSET METER SWIVELS TO ACCOMMODATE LARGER 425 & 630 METERS.

ITEM #	DESCRIPTION	SIZE
1	ASSEMBLY 2 METER PREFAB M.P.	1" x 1"
2	RISER BRACKET ADJUSTABLE	
3	METER OFFSET SWIVELS	1" x 1"
	ADD ON BAR (2 METER)	1 1/2"

DWG TITLE
MEDIUM PRESSURE, RESIDENTIAL PREFAB DOUBLE METER

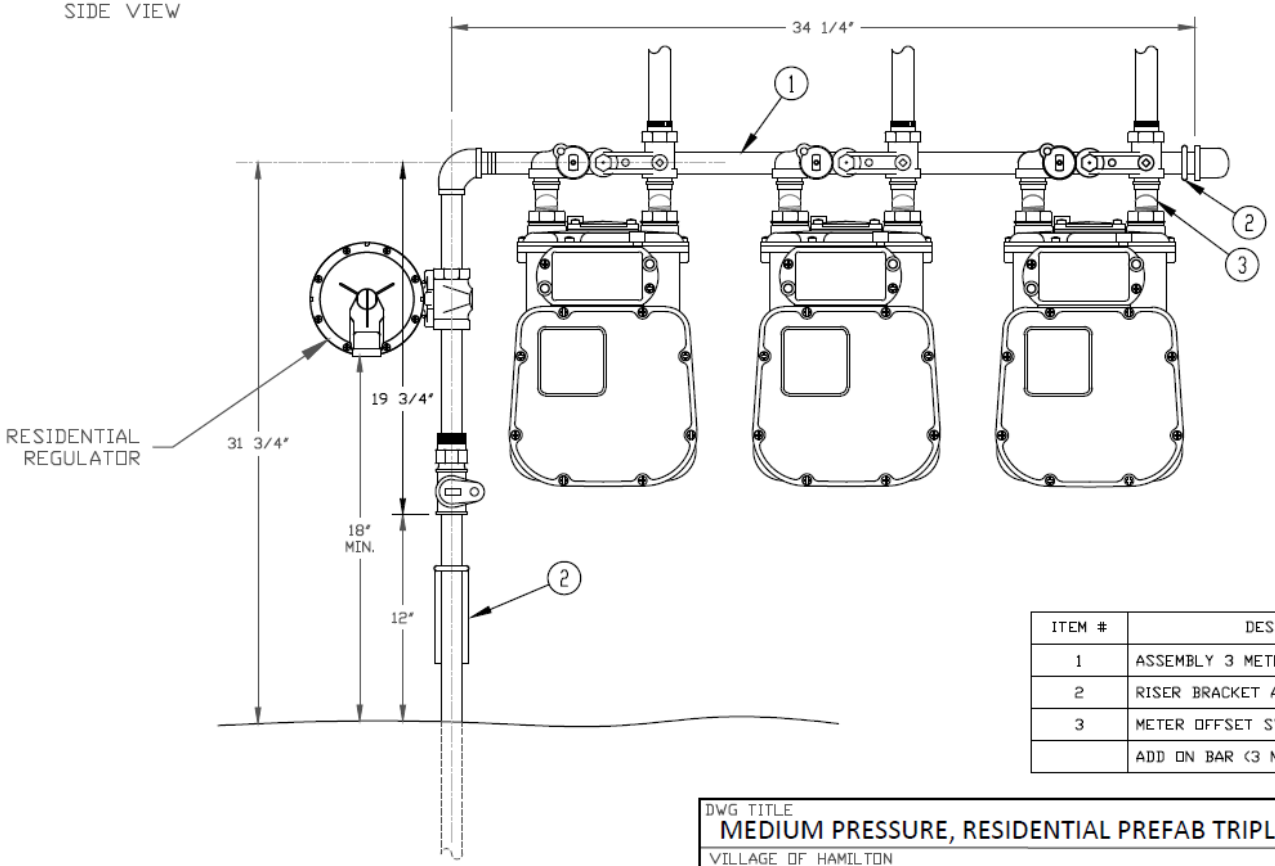
VILLAGE OF HAMILTON
SCALE: NTS
DRAWN BY: INTEGRITY ENGINEERING

DWG NO.
M-102



SIDE VIEW

NOTES:
1. MAXIMUM SERVICE PRESSURE 100 PSIG.
2. REGULATOR VENT MUST TERMINATE A MINIMUM OF 18" FROM ANY OPENING INTO THE BUILDING.
3. METER INSTALLATION TO BE PAINTED ASA 49 GREY.
4. OVERALL DIMENSIONS ARE REFERENCE ONLY.
5. IF ITEM 2 CANNOT BE ATTACHED TO THE WALL IT MAY BE ATTACHED TO A POST.
6. SET REGULATOR AT 6.5" W.C.
7. USE OFFSET METER SWIVELS TO ACCOMMODATE LARGER 425 & 630 METERS.

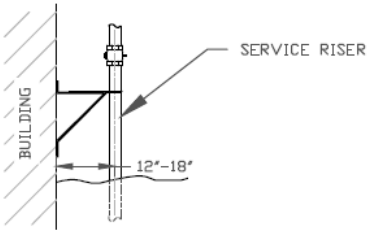


ITEM #	DESCRIPTION	SIZE
1	ASSEMBLY 3 METER PREFAB M.P.	1" x 1"
2	RISER BRACKET ADJUSTABLE	
3	METER OFFSET SWIVELS	1" x 1"
	ADD ON BAR (3 METER)	1 1/2"

DWG TITLE
MEDIUM PRESSURE, RESIDENTIAL PREFAB TRIPLE METER

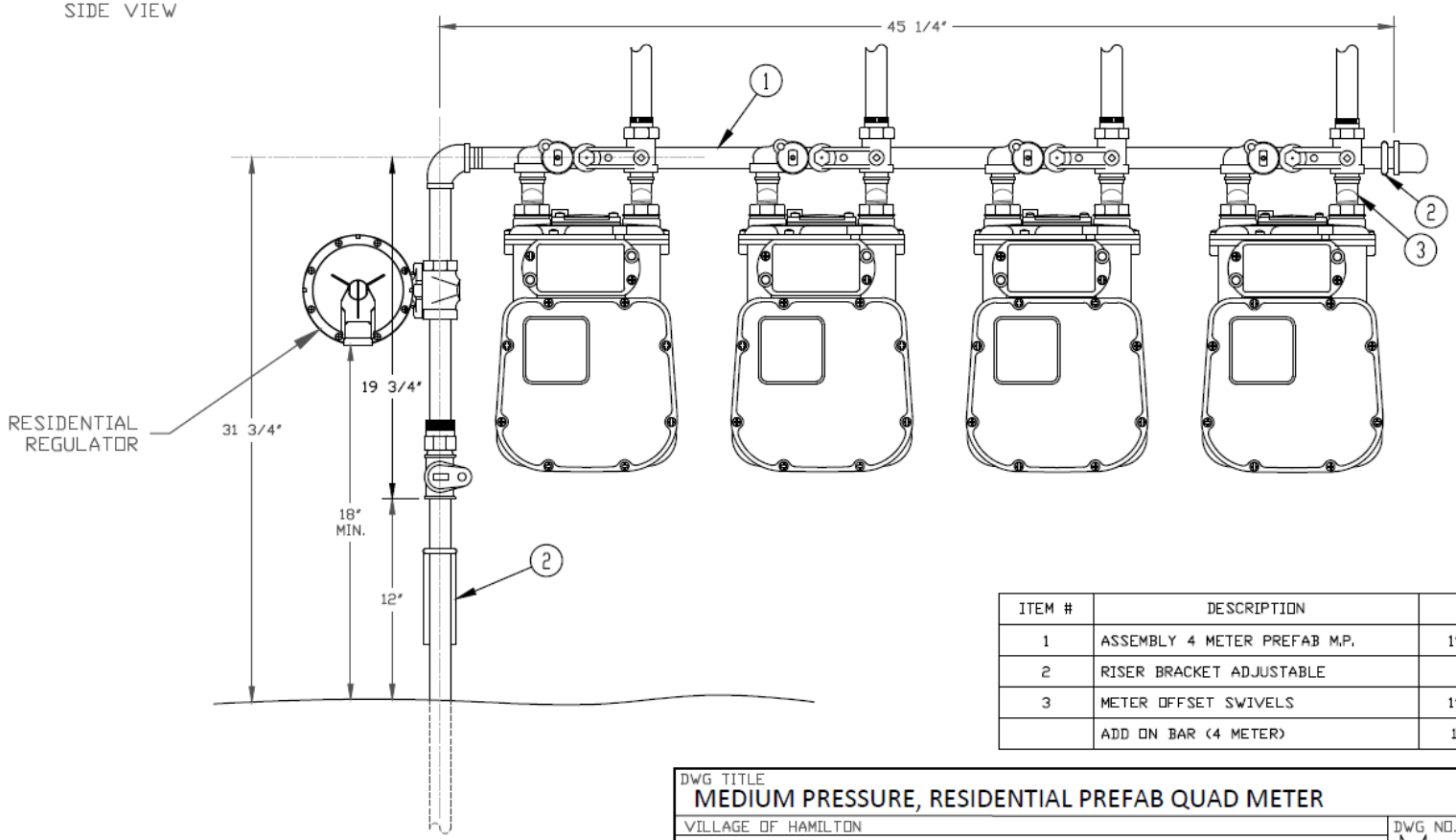
VILLAGE OF HAMILTON
SCALE: NTS
DRAWN BY: INTEGRITY ENGINEERING

DWG NO.
M-103



SIDE VIEW

NOTES:
1. MAXIMUM SERVICE PRESSURE 100 PSIG.
2. REGULATOR VENT MUST TERMINATE A MINIMUM OF 18" FROM ANY OPENING INTO THE BUILDING.
3. METER INSTALLATION TO BE PAINTED ASA 49 GREY.
4. OVERALL DIMENSIONS ARE REFERENCE ONLY.
5. IF ITEM 2 CANNOT BE ATTACHED TO THE WALL IT MAY BE ATTACHED TO A POST.
6. SET REGULATOR AT 6.5" W.C.
7. USE OFFSET METER SWIVELS TO ACCOMMODATE LARGER 425 & 630 METERS.



ITEM #	DESCRIPTION	SIZE
1	ASSEMBLY 4 METER PREFAB M.P.	1" x 1"
2	RISER BRACKET ADJUSTABLE	
3	METER OFFSET SWIVELS	1" x 1"
	ADD ON BAR (4 METER)	1 1/2"

DWG TITLE
MEDIUM PRESSURE, RESIDENTIAL PREFAB QUAD METER

VILLAGE OF HAMILTON
SCALE: NTS
DRAWN BY: INTEGRITY ENGINEERING

DWG NO.
M-104

SECTION 32.00 FIXED FACTOR METER MEASUREMENT

- Fixed Factor Measurement
- References
- Delivery Pressure for Fixed Factor Installations
- Meters
- Regulators – Village Owned
- Relief Valves – Village Owned
- Back Flow Protection
- Drawing Details of Fixed Factor Installations

1.1 FIXED FACTOR MEASUREMENT

1.2 This section details the requirements for fixed factor installations.

2.1 REFERENCES

2.2 Codes and Regulations of the State of New York, Public Safety Title 16, Part 226.11.

2.3 NYCRR Public Safety Title 16 Parts 255.351 to 255.359.

2.4 National Fuel Gas Code (National Fire Protection Association, NFPA-54 and Z223.1-1996).

2.5 New York State Fuel Gas Code. NYS Department of State Division of Code Enforcement and Administration

3.1 DELIVERY PRESSURE FOR FIXED FACTOR INSTALLATIONS

3.2 If elevated delivery pressure (14" water column or greater) is to be served, the following shall apply when utilizing fixed factor measurement:

1. **Available Delivery Pressures** - 1/2 PSIG, 1 PSIG, 2 PSIG, 3 PSIG, 5 PSIG. In certain applications, e.g. grain dryer, 10 PSIG may be made available.

As with any installation, system capacity and pressure availability must be checked. Any preliminary load over 5.0 MCFH on a medium pressure distribution system or elevated pressure requests of 2 psig and greater must be reviewed also.

2. **Capacity Ranges** – Load Capacity for Fixed Factor regulators must be Confirmed.

3. **Customer Equipment and Piping** - Customers served gas in excess of 14" W.C. (1/2 PSIG) must comply with the Gas O&M Procedures. Customers receiving this service will be required to properly install devices for the sole purpose of controlling the downstream pressure. This equipment must prevent the gas pressure on internal piping from exceeding 5 psig, except inside boiler rooms or mechanical rooms where the general public has no access.
Doors and rooms must meet a 2-hour fire-rating requirement.

4. **Requirements -** Delivery pressures of 14" wc or higher will be supplied after the customer's request has been approved and the customer has signed the letter of understanding that explains the requirements (Fuel Gas Code of New York State) associated with the elevated delivery pressure.

4.1 METERS

4.2 All meter installations must be insulated at the inlet and the outlet of the metering/regulating facilities.

4.3 All meters will be operated at (6.5" +-.5") of water column (WC) unless the billing registration is compensated for the higher pressure. A fixed factor billing constant tag should be attached to the index of the meter at time of installation.

5.1 REGULATORS – VILLAGE OWNED

5.2 If the customer demand is small enough to permit the use of a regulator with internal relief, the following rules apply:

- Regulators without internal relief must be used in conjunction with a separate relief valve.
- For each installation, operating personnel will decide on the location of the vent terminus and the vent size considering customer safety, aesthetics, and economics.
- Internal relief regulators should be located outside on the riser. The vent terminus locations shall have the vent opening pointing toward the ground, be covered with a bug-proof cap, be at least 18" above the finished grade, be 18" from any building opening and be placed where the vent cannot create a hazard.
- If the customer installs an enclosure, any vents must terminate outside the enclosure.

6.1 RELIEF VALVES – VILLAGE OWNED

6.2 Steel, aluminum, or copper piping must be used to construct relief valve vents. For each installation, operating personnel will decide on the location of the vent termination and vent size considering customer safety, aesthetics, and economics. The vent termination will be at least 8' above final grade.

6.3 Weather resistant protective caps will be installed on all relief valve vents.

6.4 All relief valve vents will have weep holes drilled through the lower elbow or cap for water to drain (per attached drawings).

6.5 Relief valves will be installed except where internal relief regulators or monitor regulators may be used.

6.6 Relief valves used on individual services will be installed above ground only. Any isolation valve installed ahead of a relief valve must be locked in the open position except for maintenance or testing.

6.7 Inspection of all relief valves will be done as required in the Gas O&M Manual.

7.1 BACK FLOW PROTECTION

7.2 A suitable protective device shall be installed and maintained by the customer downstream of our regulator and metering facilities under the following conditions:

(a) If the gas utilization equipment might induce a vacuum at the meter, install a backpressure regulator downstream of our facilities.

(b) If the gas utilization equipment might induce a backpressure, or if it is connected to a source of oxygen or compressed air, install a check valve. If liquefied petroleum gas or other supplementary gas is used as a standby and might flow back into our facilities, a three-way valve, installed to admit the standby supply

8.1 DRAWING DETAILS OF FIXED FACTOR INSTALLATIONS

M-300 Fixed Factor – Rotary bypass– 8C/11C/15C

M-301 Fixed Factor - Rotary bypass– 2M/3M

M-302 Fixed Factor - Rotary bypass- 5M/7M

3	1	REGULATOR
4	1	NIPPLE, THREADED 1"x3"
5	1	REDUCER, THREADED 1"x2"
6	5	NIPPLE, THREADED 2"x5"
7	1	TEE, COMPRESSION 2"
8	1	NIPPLE, THREADED 2"x7"
9	3	VALVE, BALL 2" FULL PORT LOCKWING
10	1	ELBOW, 90 DEGREE COMPRESSION LOCK 2"
11	2	FLANGE, THREADED 2" CL150
12	1	GASKET STRAINER 2" FULL FACE
13	1	2" INSULATED GASKET SET
14	8	HEX HEAD BOLT, 5/8" x 1 3/4"
15	1	NIPPLE, THREADED 2"x13"
16	1	NIPPLE, THREADED 2"x14"
17	1	ELBOW, THREADED 90 DEGREE
18	1	NIPPLE, THREADED 2"x8"
19	1	TEE THREADED
20	1	PLUG, THREADED 2"
21	2	WALL MOUNT SUPPORT BRACKET (*SEE NOTE 3*)

NOTES:

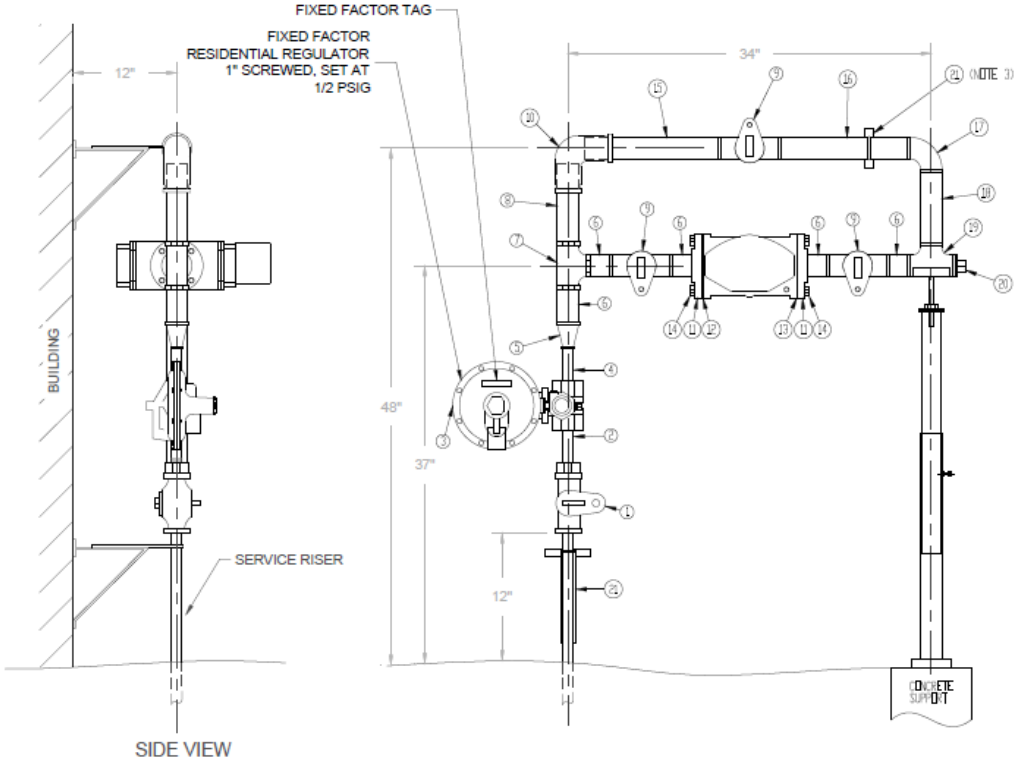
1. FABRICATION ASSEMBLY ALLOWS FOR FASTENING BY WELD, FLANGE, THREAD OR COMPRESSION FITTING AS AGREED TO BY ORDER. OVERALL REFERENCE DIMENSIONS SHALL BE MAINTAINED REGARDLESS OF ASSEMBLY FASTENING TYPE.
2. ORIENTATION OF METER SET INSTALLATION MAY BE VERTICAL OR HORIZONTAL AS AGREED TO BY ORDER.
3. SUPPORT SHALL BE EITHER CUSTOMER PROVIDED SONOTUBE OR VILLAGE INSTALLED WALL BRACKET.
4. COAT COMPLETED ASSEMBLY WITH PAINT ASA #49 GRAY OR TSA THERMALLY SPRAYED ALUMINUM) AS AGREED TO BY ORDER.
5. MAXIMUM SERVICE PRESSURE 100 PSIG.
6. REGULATOR TO BE SIZED FOR SPECIFIC APPLICATION.

A. NOTES TO INSTALLER:
1. OVERALL DIMENSIONS ARE REFERENCE ONLY.
2. REGULATOR VENT MUST TERMINATE A MINIMUM OF 18" FROM FINAL GRADE AND A MINIMUM OF 18" FROM ANY OPENING INTO THE BUILDING.

B. PRIOR TO CUSTOMER TIE-IN:
1. INSULATE SUPPORT BRACKET FROM METER SET.

C. AFTER CUSTOMER TIE-IN:
1. LEVEL METER TO WITHIN 1/16" PER FOOT. SLOWLY ADD GRADE 50 METER OIL TO THE RESERVOIRS AND FILL TO CENTER OF LEVEL GAUGES. DO NOT OVER FILL.
2. COMPLETE METER INSTALLATION ARRANGEMENT TO BE PAINTER ASA 49 GRAY.

METER CAPACITY TABLE	
METER SIZE	MAXIMUM CAPACITY
8C	800
11C	1100
15C	1500



SIDE VIEW

DWG TITLE
MEDIUM PRESSURE MAIN, 8C, 11C & 15C FIXED FACTOR METER SET

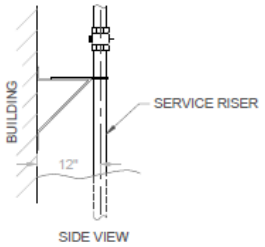
VILLAGE OF HAMILTON
SCALE: NTS
DRAWN BY: INTEGRITY ENGINEERING

DWG NO.
M-300

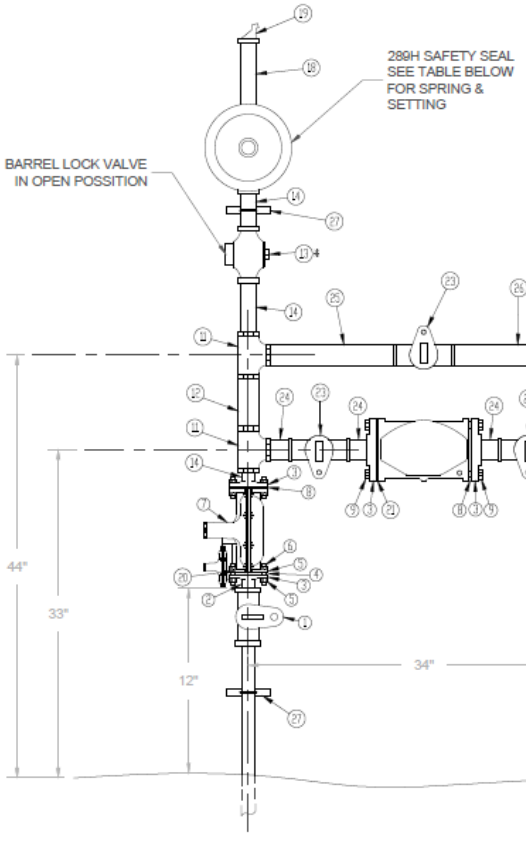
5	16	5/8" HEX NUT & WASHER
6	8	5/8" x 3 1/2" STUD
7	1	FLANGED REGULATOR
8	2	2" INSUL. GASKET
9	8	5/8" x 1 3/4" HEX HEAD BOLT
10	1	2" PLUG
11	2	2" COMPRESSION TEE
12	1	2" x 6" THD. NIPPLE
*13	1	2" FULLPORT VALVE DOUBLE LOCKWING
14	4	2" x 4" THD. NIPPLE
15	2	2" x 8" THD. NIPPLE
16	2	2" THD. TEE
17	1	2" THD. CAP
18	1	2" ALUM. PIPE
19	1	2" VENT CAP
20	1	PETE'S PLUG
21	1	2" STRAINER GASKET FULL FACE
22	1	2" THD. ELL 90D
23	3	2" THD. BALL VALVE FULL PORT LOCKWING
24	4	2" x 5" THD. NIPPLE
25	1	2" x 13" THD NIPPLE
26	1	2" x 14" THD. NIPPLE
27	3	WALL MOUNT SUPPORT BRACKET *(SEE NOTE 3)*

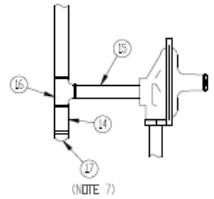
* MAY BE SUBSTITUTED DEPENDING ON SYSTEM PRESSURES.

4. COAT COMPLETED ASSEMBLY WITH PAINT ASA #49 GRAY OR TSA THERMALLY SPRAYED ALUMINUM) AS AGREED TO BY ORDER.
5. MAXIMUM SERVICE PRESSURE 100 PSIG.
6. REGULATOR TO BE SIZED FOR SPECIFIC APPLICATION.
7. DRILL 3/8" HOLE IN CAP, INSTALL SCREEN, TO PREVENT WATER COLLECTION.



SIDE VIEW





SIDE VIEW DETAIL
289H SAFETY SEAL

NOTES:

1. METER INSTALLATIONS TO BE PAINTED ASA 49 GRAY.
2. CONCRETE SUPPORT TO BE POURED BY CUSTOMER, SUPPORT TO BE 12" IN DIAMETER, BELOW FROST LINE AND LEVEL WITH FINAL GRADE.
3. OVERALL DIMENSIONS ARE FOR REFERENCE ONLY.
4. LEVEL METER TO WITHIN 1/16" PER FOOT.
5. THERE ARE 2 OIL RESERVOIRS. SLOWLY ADD GRADE 50 METER OIL AND FILL TO THE CENTER OF THE OIL LEVEL GAUGES. DO NOT OVER FILL.
6. RELIEF VALVE VENT PIPING TO TERMINATE 8' ABOVE FINAL GRADE AND AWAY FROM ANY BUILDING OPENINGS. EXTRA LONG PIPING MAY AFFECT THE OPERATION OF THE RELIEF VALVE.
7. SUPPORT VENT PIPING WITH WALL BRACKET.
8. IF SERVICE IS STEEL INSULATE SUPPORT BRACKET AND RELIEF VENT PIPE FROM METER SET.
9. INSTALL ROTARY METER SPOOL (RMS-1) PRIOR TO CUSTOMER PIPING IS TIED - IN. INSTALL ROOTS METER.

	2M MAXIMUM CAPACITY	3M MAXIMUM CAPACITY	RELIEF SPRING	RELIEF SETTING
1/2#	2022 SCFH	3033 SCFH	.5-2.25 PSIG	1 PSIG
1#	2090 SCFH	3135 SCFH	.5-2.25 PSIG	1.5 PSIG
2#	2226 SCFH	3339 SCFH	1.75-7 PSIG	3 PSIG
3#	2378 SCFH	3567 SCFH	1.75-7 PSIG	4.5 PSIG
5#	2636 SCFH	3594 SCFH	4-10 PSIG	7.5 PSIG

FACE TO FACE DIMENSIONS
2M - 6 3/4"
3M - 6 3/4"

DWG TITLE
MEDIUM PRESSURE MAIN, 2M & 3M FIXED FACTOR METER SET

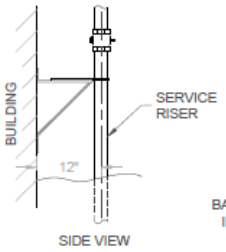
VILLAGE OF HAMILTON
SCALE: NTS
DRAWN BY: INTEGRITY ENGINEERING

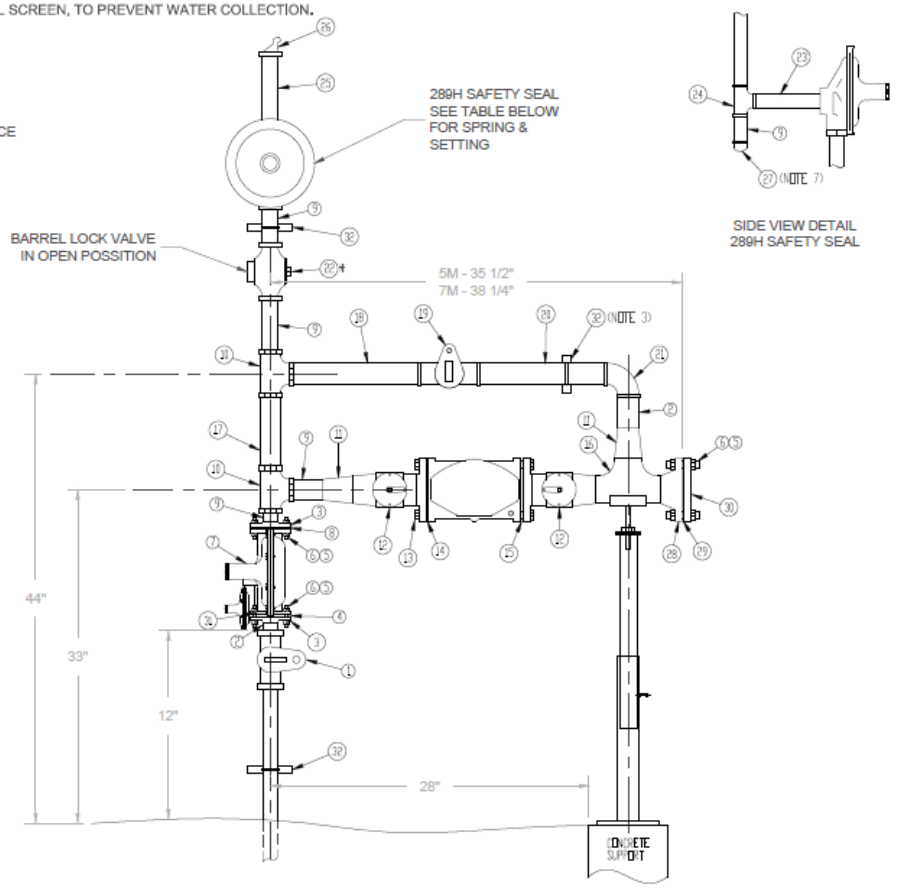
DWG NO.
M-301

1	1	2" LOCKWING VALVE
2	2	2" x 3" THD. NIPPLE
3	2	2" THD. FLANGE FULL FACE
4	1	2" GASKET FULL FACE
5	32	5/8" HEX NUT & WASHER
6	16	5/8" x 3 1/2" STUD
7	1	FLANGED REGULATOR
8	1	2" INSUL. GASKET
9	4	2" x 4" THD. NIPPLE
10	2	2" COMPRESSION TEE
11	2	2" x 3" WELDED REDUCER
12	2	3" FULL PORT WxF BALL VALVE LOCKWING
13	8	5/8" x 1 3/4" HEX HEAD BOLT
14	1	3" STRAINER GASKET FULL FACE
15	1	3" INSULATED GASKET FULL FACE
16	1	3" WELDED TEE STD
17	1	2" x 6" THD. NIPPLE
18	1	2" x 12" THD. NIPPLE
19	1	2" FULL PORT VALVE LOCKWING
20	1	2" x 13" THD. NIPPLE
21	1	2" THD. ELL 90 DEGREE
*22	1	2" FULL PORT VALVE DOUBLE LOCKWING
23	1	2" x 8" THD. NIPPLE
24	1	2" THD. TEE
25	1	2" ALUM. PIPE
26	2	2" VENT CAP
27	1	2" THD. CAP
28	1	3" WELDNECK FLANGE
29	1	3" INSULATING GASKET
30	1	3" BLIND FLANGE
31	1	1/4" PETES PLUG
32	3	WALL MOUNT SUPPORT BRACKET *(SEE NOTE 3)*

* MAY BE SUBSTITUTED DEPENDING ON SYSTEM PRESSURES.

1. FABRICATION ASSEMBLY ALLOWS FOR FASTENING BY WELD, FLANGE, THREAD OR COMPRESSION FITTING AS AGREED TO BY ORDER. OVERALL REFERENCE DIMENSIONS SHALL BE MAINTAINED REGARDLESS OF ASSEMBLY FASTENING TYPE.
2. ORIENTATION OF METER SET INSTALLATION MAY BE VERTICAL OR HORIZONTAL AS AGREED TO BY ORDER.
3. SUPPORT SHALL BE EITHER CUSTOMER PROVIDED SONOTUBE OR VILLAGE INSTALLED WALL BRACKET.
4. COAT COMPLETED ASSEMBLY WITH PAINT ASA #49 GRAY OR TSA THERMALLY SPRAYED ALUMINUM) AS AGREED TO BY ORDER.
5. MAXIMUM SERVICE PRESSURE 100 PSIG.
6. REGULATOR TO BE SIZED FOR SPECIFIC APPLICATION.
7. DRILL 3/8" HOLE IN CAP, INSTALL SCREEN, TO PREVENT WATER COLLECTION.





NOTES:

1. METER INSTALLATIONS TO BE PAINTED ASA 49 GRAY.
2. CONCRETE SUPPORT TO BE POURED BY CUSTOMER, SUPPORT TO BE 12" IN DIAMETER, BELOW FROST LINE AND LEVEL WITH FINAL GRADE.
3. OVERALL DIMENSIONS ARE FOR REFERENCE ONLY.
4. LEVEL METER TO WITHIN 1/16" PER FOOT.
5. THERE ARE 2 OIL RESERVOIRS. SLOWLY ADD GRADE 50 METER OIL AND FILL TO THE CENTER OF THE OIL LEVEL GAUGES. DO NOT OVER FILL.
6. RELIEF VALVE VENT PIPING TO TERMINATE 8' ABOVE FINAL GRADE AND AWAY FROM ANY BUILDING OPENINGS. EXTRA LONG PIPING MAY AFFECT THE OPERATION OF THE RELIEF VALVE.
7. SUPPORT VENT PIPING WITH WALL BRACKET.
8. IF SERVICE IS STEEL INSULATE SUPPORT BRACKET AND RELIEF VENT PIPE FROM METER SET.
9. INSTALL ROTARY METER SPOOL (RMS-1) PRIOR TO CUSTOMER PIPING IS TIED - IN INSTALL ROOTS METER.

	5M MAXIMUM CAPACITY	7M MAXIMUM CAPACITY	RELIEF SPRING	RELIEF SETTING
1/2#	5055 SCFH	7077 SCFH	.5-2.25 PSIG	1 PSIG
1#	5225 SCFH	7315 SCFH	.5-2.25 PSIG	1.5 PSIG
2#	5565 SCFH	7791 SCFH	1.75-7 PSIG	3 PSIG
3#	5945 SCFH	8323 SCFH	1.75-7 PSIG	4.5 PSIG
4#	6245 SCFH	8743 SCFH	4-10 PSIG	6.0 PSIG
5#	6590 SCFH	9226 SCFH	4-10 PSIG	7.5 PSIG

FACE TO FACE DIMENSIONS
5M – 6 3/4"
7M – 9 1/2"

DWG TITLE
MEDIUM PRESSURE MAIN, 5M & 7M FIXED FACTOR METER SET

VILLAGE OF HAMILTON
SCALE: NTS
DRAWN BY: INTEGRITY ENGINEERING

DWG NO.
M-302

SECTION 33.00 COMMERCIAL AND INDUSTRIAL MEASUREMENT

- Line Pressure Measurement
- References
- Elevated Delivery Pressures
- Meters
- Regulators – Village Owned
- Relief Valves – Village Owned
- Back Flow Protection
- Drawings: Industrial and Commercial Sets

1.1 LINE PRESSURE MEASUREMENT

1.2 This section details requirements for Line Pressure Measurement such as industrial and commercial meter sets.

2.1 REFERENCES

2.2 NYCRR Public Safety Title 16 Parts 255.351 to 255.359

2.3 National Fuel Gas Code (National Fire Protection Association, NFPA-54 and Z223.1-1996).

2.4 New York State Fuel Gas Code. NYS Department of State Division of Code Enforcement and Administration

3.1 ELEVATED DELIVERY PRESSURES

3.2 If elevated delivery pressure (greater than 6.5 +/- 0.5" WC) is to be served, the following shall apply:

1. **Customer Equipment and Piping** - Customers receiving this service will be required to properly install approved over pressure protection devices for the sole purpose of controlling the downstream pressure. This equipment must prevent the gas pressure on internal piping from exceeding 5 psig except inside boiler rooms or mechanical rooms where the general public has no access. Doors and rooms must meet a 2-hour fire-rating requirement.

2. **Requirements -** Delivery pressures of 14" wc or higher will be supplied after the customers request has been approved and the customer has signed the letter of understanding that explains the requirements (Fuel Gas Code of New York State) associated with the elevated delivery pressure.

4.1 METERS

4.2 All new or rebuilt meter installations must be insulated at the inlet and the outlet of Village's metering/regulating facilities.

4.3 All meters will be operated at 6.5 + .5" of water column (WC) unless the billing registration is compensated for the higher pressure.

4.4 All installations using temperature and/or pressure compensating instruments

must be enclosed within a building.

4.5 Rotary meters should be used on as many installations as possible.

5.1 REGULATORS – VILLAGE OWNED

5.2 If the customer demand is small enough to permit the use of a regulator with internal relief, the following rules apply:

- Regulators without internal relief must be used in conjunction with a separate relief valve.
- For each installation, operating personnel will decide on the location of the vent terminus and the vent size considering customer safety, aesthetics, and economics.
- Internal relief regulators should be located outside on the riser. The vent terminus locations shall have the vent opening pointing toward the ground, be covered with an insect-proof cap, be at least 18” above the finished grade, be 18” from any building opening and be placed where the vent cannot create a hazard.
- If the customer installs an enclosure, any vents must terminate outside the enclosure.

6.1 RELIEF VALVES – VILLAGE OWNED

6.2 Steel, aluminum, or copper piping must be used to construct relief valve vents.

6.3 For each installation, operating personnel will decide on the location of the vent termination and vent size considering customer safety, aesthetics, and economics.

6.4 All relief valve vents will have weep holes drained through the lower elbow or cap for water to drain.

6.5 Weather resistant protective caps will be installed on all relief valve vents.

6.6 Relief valves will be installed except where internal relief or monitor regulators may be used.

6.7 Relief valves used on individual services will be installed above ground only. Any isolation valve installed ahead of a relief valve must be locked in the open position except for maintenance or testing.
Inspection of all relief valves will be done as required in the Gas O&M Manual.

7.1 BACK FLOW PROTECTION

7.2 A suitable protective device shall be installed and maintained by the customer downstream of our regulator and metering facilities under the following conditions:

(a) If the gas utilization equipment might induce a vacuum at the meter, install a backpressure regulator downstream of our facilities.

(b) If the gas utilization equipment might induce a backpressure, or if it is connected to a source of oxygen or compressed air, install a check valve. If liquefied petroleum gas or other supplementary gas is used as a standby and might flow back into our facilities, a three-way valve, installed to admit the standby supply.

8.1 DRAWINGS: INDUSTRIAL AND COMMERCIAL SETS

M-200- Rotary - 8C/11C/15C

M-201- Rotary - 2M/3M

M-202- Rotary - 5M/7M

1	1	1" INSULATED LOCKWING VALVE
2	1	NIPPLE, THREADED 1"x4"
3	1	REGULATOR
4	1	NIPPLE, THREADED 1"x3"
5	1	REDUCER, THREADED 1"x2"
6	4	NIPPLE, THREADED 2"x5"
7	1	TEE, COMPRESSION 2"
8	1	NIPPLE, THREADED 2"x7"
9	3	VALVE, BALL 2" FULL PORT LOCKWING
10	1	ELBOW, 90 DEGREE COMPRESSION LOCK 2"
11	2	FLANGE, THREADED 2" CL150
12	1	GASKET STRAINER 2" FULL FACE
13	1	INSULATED GASKET SET
14	8	HEX HEAD BOLT, 5/8" x 1 3/4"
15	1	NIPPLE, THREADED 2"x13"
16	1	NIPPLE, THREADED 2"x14"
17	1	ELBOW, THREADED 90 DEGREE
18	1	NIPPLE, THREADED 2"x8"
19	1	TEE, THREADED
20	1	NIPPLE, THREADED 2"x3"
21	1	UNION, INSULATED 2"
22	1	PLUG, THREADED 2"
23	2	WALL MOUNT SUPPORT BRACKET (*SEE NOTE 3)*

NOTES:

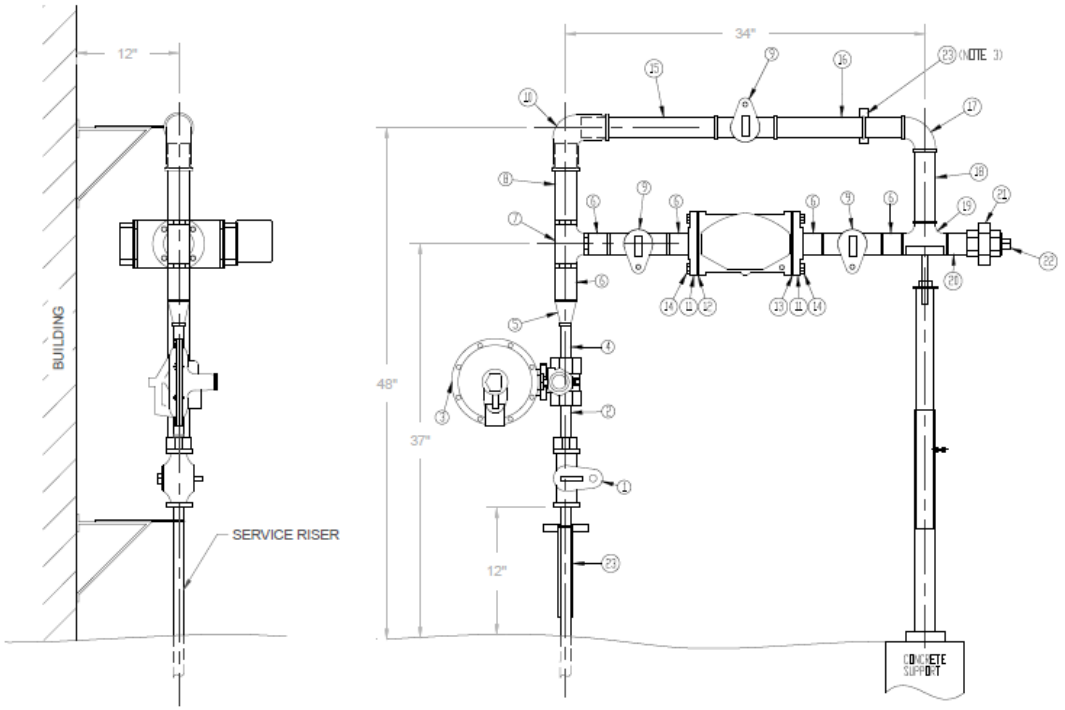
1. FABRICATION ASSEMBLY ALLOWS FOR FASTENING BY WELD, FLANGE, THREAD OR COMPRESSION FITTING AS AGREED TO BY ORDER. OVERALL REFERENCE DIMENSIONS SHALL BE MAINTAINED REGARDLESS OF ASSEMBLY FASTENING TYPE.
2. ORIENTATION OF METER SET INSTALLATION MAY BE VERTICAL OR HORIZONTAL AS AGREED TO BY ORDER.
3. SUPPORT SHALL BE EITHER CUSTOMER PROVIDED SONOTUBE OR VILLAGE INSTALLED WALL BRACKET.
4. COAT COMPLETED ASSEMBLY WITH PAINT ASA #49 GRAY OR TSA THERMALLY SPRAYED ALUMINUM) AS AGREED TO BY ORDER.
5. MAXIMUM SERVICE PRESSURE 100 PSIG.
6. REGULATOR TO BE SIZED FOR SPECIFIC APPLICATION.

A. NOTES TO INSTALLER:
1. OVERALL DIMENSIONS ARE REFERENCE ONLY.
2. REGULATOR VENT MUST TERMINATE A MINIMUM OF 18" FROM ANY OPENING INTO THE BUILDING.
3. SET REGULATOR AT 6.5" W.C.
4. OUTLET OF METER SHALL BE INSULATED USING INSULATED FLANGE KIT.

B. PRIOR TO CUSTOMER TIE-IN:
1. INSULATE SUPPORT BRACKET FROM METER SET.

C. AFTER CUSTOMER TIE-IN:
1. LEVEL METER TO WITHIN 1/16" PER FOOT. SLOWLY ADD GRADE 50 METER OIL TO THE RESERVOIRS AND FILL TO CENTER OF LEVEL GAUGES. DO NOT OVER FILL.
2. COMPLETE METER INSTALLATION ARRANGEMENT TO BE PAINTER ASA 49 GRAY.

METER CAPACITY TABLE	
METER SIZE	MAXIMUM CAPACITY
8C	800
11C	1100
15C	1500



SIDE VIEW

DWG TITLE
MEDIUM PRESSURE MAIN, 8C, 11C & 15C METER SET

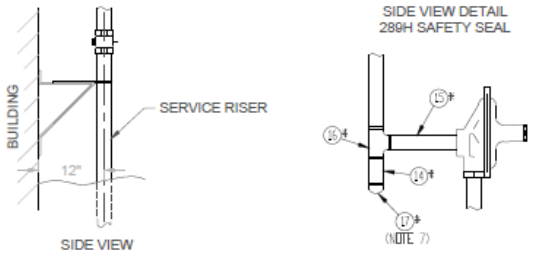
VILLAGE OF HAMILTON
SCALE: NTS
DRAWN BY: INTEGRITY ENGINEERING

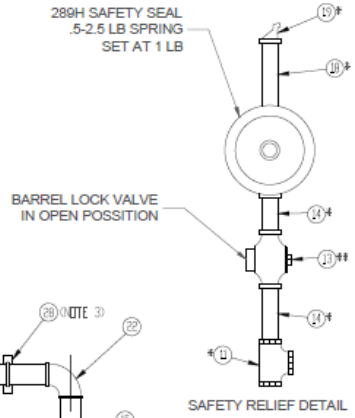
DWG NO.
M-200

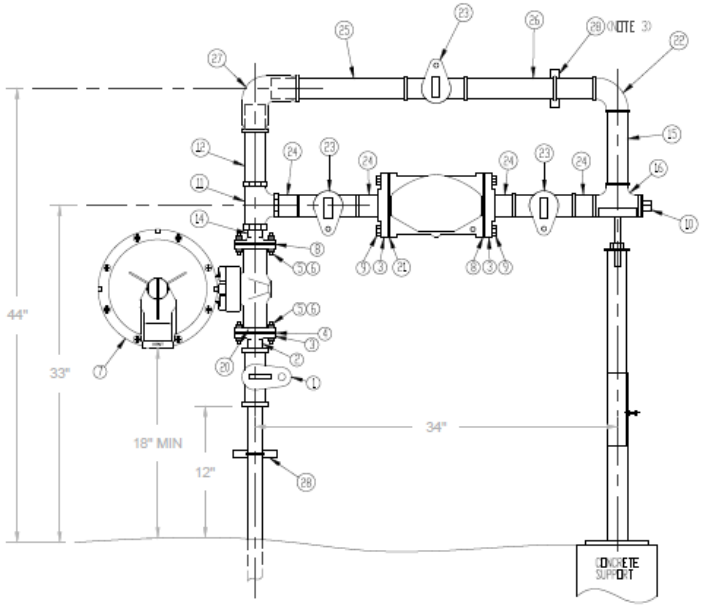
2	1	2" x 3" THD. NIPPLE
3	4	2" THD. FLANGE FULL FACE
4	1	2" GASKET FULL FACE
5	16	5/8" HEX NUT & WASHER
6	8	5/8" x 3 1/2" STUD
*7	1	FLANGED REGULATOR
8	2	2" INSUL. GASKET
9	8	5/8" x 1 3/4" HEX HEAD BOLT
10	1	2" PLUG
*11	2	2" COMPRESSION TEE
12	1	2" x 6" THD. NIPPLE
**13	1	2" FULLPORT VALVE DOUBLE LOCKWING
*14	3	2" x 4" THD. NIPPLE
*15	2	2" x 8" THD. NIPPLE
*16	2	2" THD. TEE
*17	1	2" THD. CAP
*18	1	2" ALUM. PIPE
*19	1	2" VENT CAP
20	1	PETE'S PLUG
21	1	2" STRAINER GASKET FULL FACE
22	1	2" THD. ELL 90D
23	3	2" THD. BALL VALVE FULL PORT LOCKWING
24	4	2" x 5" THD. NIPPLE
25	1	2" x 13" THD NIPPLE
26	1	2" x 14" THD. NIPPLE
27	1	2" ELL COMPRESSION LOCK
28	2	WALL MOUNT SUPPORT BRACKET *(SEE NOTE 3)*

* MAY BE SUBSTITUTED WHEN INTERNAL RELIEF REGULATOR IS NOT USED.
** MAY BE SUBSTITUTED DEPENDING ON SYSTEM PRESSURES.

1. FABRICATION ASSEMBLY ALLOWS FOR FASTENING BY WELD, FLANGE, THREAD OR COMPRESSION FITTING AS AGREED TO BY ORDER. OVERALL REFERENCE DIMENSIONS SHALL BE MAINTAINED REGARDLESS OF ASSEMBLY FASTENING TYPE.
2. ORIENTATION OF METER SET INSTALLATION MAY BE VERTICAL OR HORIZONTAL AS AGREED TO BY ORDER.
3. SUPPORT SHALL BE EITHER CUSTOMER PROVIDED SONOTUBE OR VILLAGE INSTALLED WALL BRACKET.
4. COAT COMPLETED ASSEMBLY WITH PAINT ASA #49 GRAY OR TSA THERMALLY SPRAYED ALUMINUM) AS AGREED TO BY ORDER.
5. MAXIMUM SERVICE PRESSURE 100 PSIG.
6. REGULATOR TO BE SIZED FOR SPECIFIC APPLICATION.
7. DRILL 3/8" HOLE IN CAP, INSTALL SCREEN, TO PREVENT WATER COLLECTION.







NOTES:

1. METER INSTALLATIONS TO BE PAINTED ASA 49 GRAY.
2. CONCRETE SUPPORT TO BE POURED BY CUSTOMER, SUPPORT TO BE 12" IN DIAMETER, BELOW FROST LINE AND LEVEL WITH FINAL GRADE.
3. OVERALL DIMENSIONS ARE FOR REFERENCE ONLY.
4. LEVEL METER TO WITHIN 1/16" PER FOOT.
5. THERE ARE 2 OIL RESERVOIRS. SLOWLY ADD GRADE 50 METER OIL AND FILL TO THE CENTER OF THE OIL LEVEL GAUGES. DO NOT OVER FILL.
6. RELIEF VALVE VENT PIPING TO TERMINATE 8' ABOVE FINAL GRADE AND AWAY FROM ANY BUILDING OPENINGS. EXTRA LONG PIPING MAY AFFECT THE OPERATION OF THE RELIEF VALVE.
7. SUPPORT VENT PIPING WITH WALL BRACKET.
8. IF SERVICE IS STEEL INSULATE SUPPORT BRACKET AND RELIEF VENT PIPE FROM METER SET.

METER CAPACITY TABLE	
METER SIZE	MAXIMUM CAPACITY
2M	2000 SCFH
3M	3000 SCFH

FACE TO FACE DIMENSIONS
ROOTS 2M - 6 3/4"
ROOTS 3M - 6 3/4"

DWG TITLE
MEDIUM PRESSURE MAIN, 2M & 3M METER SET

VILLAGE OF HAMILTON
SCALE: NTS
DRAWN BY: INTEGRITY ENGINEERING

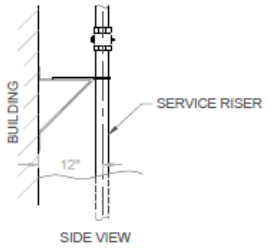
DWG NO.
M-201

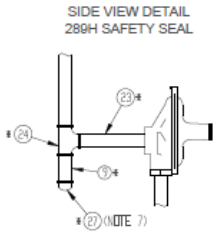
ITEM	QTY.	DESCRIPTION
1	1	2" LOCKWING VALVE
2	2	2" x 3" THD. NIPPLE
3	2	2" THD. FLANGE FULL FACE
4	1	2" GASKET FULL FACE
5	32	5/8" HEX NUT & WASHER
6	16	5/8" x 3 1/2" STUD
*7	1	FLANGED REGULATOR
8	1	2" INSUL. GASKET
*9	4	2" x 4" THD. NIPPLE
*10	2	2" COMPRESSION TEE
11	2	2" x 3" WELDED REDUCER
12	2	3" FULL PORT WxF BALL VALVE LOCKWING
13	8	5/8" x 1 3/4" HEX HEAD BOLT
14	1	3" STRAINER GASKET FULL FACE
15	1	3" INSULATED GASKET FULL FACE
16	1	3" WELDED TEE STD
17	1	2" x 6" THD. NIPPLE
18	1	2" x 12" THD. NIPPLE
19	1	2" FULL PORT VALVE LOCKWING
20	1	2" x 13" THD. NIPPLE
21	1	2" THD. ELL 90 DEGREE
**22	1	2" FULL PORT VALVE DOUBLE LOCKWING
*23	1	2" x 8" THD. NIPPLE
*24	1	2" THD. TEE
*25	1	2" ALUM. PIPE
*26	2	2" VENT CAP
*27	1	2" THD. CAP
28	1	3" WELDNECK FLANGE
29	1	3" INSULATING GASKET
30	1	3" BLIND FLANGE
31	1	2" ELL COMPRESSON LOCK
32	1	1/4" PETES PLUG
33	2	WALL MOUNT SUPPORT BRACKET *(SEE NOTE 3)*

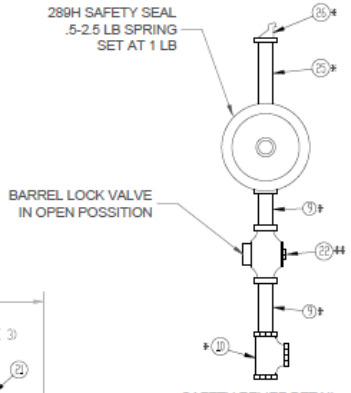
* MAY BE SUBSTITUTED WHEN INTERNAL RELIEF REGULATOR IS NOT USED.
** MAY BE SUBSTITUTED DEPENDING ON SYSTEM PRESSURES.

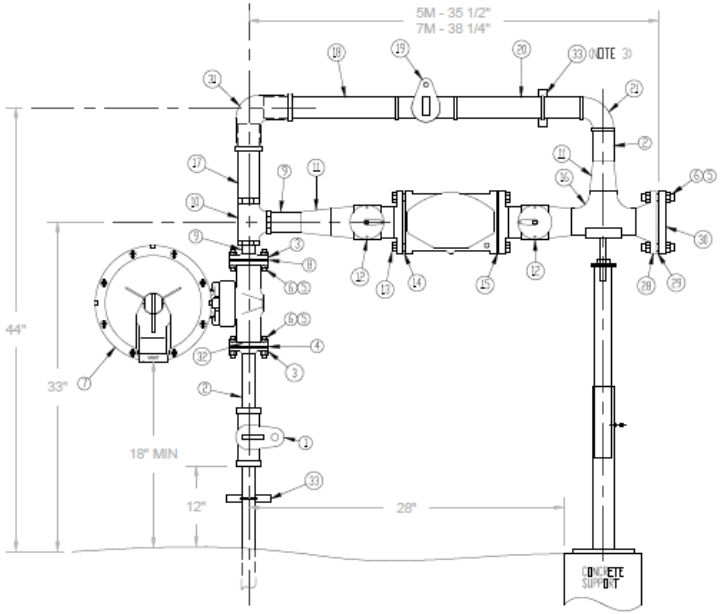
METER CAPACITY TABLE	
METER SIZE	MAXIMUM CAPACITY
5M	5000 SCFH
7M	7000 SCFH

FACE TO FACE DIMENSIONS
5M - 6 3/4"
7M - 9 1/2"









A. NOTES TO INSTALLER
1. OVERALL DIMENSIONS ARE REFERENCE ONLY.
2. RELIEF VALVE VENT PIPING SHALL TERMINATE A MINIMUM OF 8' ABOVE FINAL GRADE AND AWAY FROM ANY BUILDING OPENINGS. IF GREATER THAN 8' IN HEIGHT CALCULATIONS MUST BE PERFORMED TO ENSURE PROPER SIZING.
3. SUPPORT VENT PIPING USING A WALL BRACKET.

B. PRIOR TO CUSTOMER TIE-IN
1. INSULATE SUPPORT BRACKET FROM METER SET & RELIEF VENT PIPING.

C. AFTER CUSTOMER TIE-IN
1. LEVEL METER TO WITHIN 1/16" PER FOOT. SLOWLY ADD GRADE 50 METER OIL TO THE RESERVOIRS AND FILL TO CENTER OF LEVEL GAUGES. DO NOT OVER FILL.
2. INSTALL PERMANENT PIPE SUPPORT TO CONCRETE THEN REMOVE TEMPORARY SUPPORT.
3. COMPLETE METER INSTALLATION ARRANGEMENT TO BE PAINTER ASA 49 GRAY.

D. NOTES TO CUSTOMER:
1. CONCRETE SUPPORT TO BE POURED BY CUSTOMER. SUPPORT MUST BE 12" Ø, BELOW FROST LINE AND LEVEL WITH FINAL GRADE.
2. SEE "OPTIONAL MATERIAL" NOTE ABOVE.

NOTES:

1. FABRICATION ASSEMBLY ALLOWS FOR FASTENING BY WELD, FLANGE, THREAD OR COMPRESSION FITTING AS AGREED TO BY ORDER. OVERALL REFERENCE DIMENSIONS SHALL BE MAINTAINED REGARDLESS OF ASSEMBLY FASTENING TYPE.
2. ORIENTATION OF METER SET INSTALLATION MAY BE VERTICAL OR HORIZONTAL AS AGREED TO BY ORDER.
3. SUPPORT SHALL BE EITHER CUSTOMER PROVIDED SONOTUBE OR VILLAGE INSTALLED WALL BRACKET.
4. COAT COMPLETED ASSEMBLY WITH PAINT ASA #49 GRAY OR TSA THERMALLY SPRAYED ALUMINUM) AS AGREED TO BY ORDER.
5. MAXIMUM SERVICE PRESSURE 100 PSIG.
6. REGULATOR TO BE SIZED FOR SPECIFIC APPLICATION.
7. DRILL 3/8" HOLE IN CAP, INSTALL SCREEN, TO PREVENT WATER COLLECTION.

DWG TITLE
MEDIUM PRESSURE MAIN, 5M & 7M METER SET

VILLAGE OF HAMILTON
SCALE: NTS
DRAWN BY: INTEGRITY ENGINEERING

DWG NO.
M-202

SECTION 34.00 CORROSION

- General Requirements
- References
- General
- Anode
- Surveys

1.1 CORROSION: GENERAL REQUIRMENTS

1.2 This section describes the general requirements for corrosion control.

2.1 REFERENCES

2.2 NYCRR Public Safety Title 16 Parts 255.455 to 255.359
255.455 Chapter III Gas Utilities.

2.3 American Society of Mechanical Engineering (ASME), Gas Transmission and Distribution Piping Systems, ASME B31.8 - 1995 Edition.

2.4 Department of Transportation (DOT), Part 192, 49 CFR, Subpart J, Requirements of Corrosion Control.

2.5 National Association of Corrosion Engineers (NACE).

3.1 GENERAL

3.2 All steel pipe, valves, and fittings (distribution and transmission) shall be coated or wrapped entirely for new construction jobs. The manufacturer's installation procedures shall be followed when installing all materials.

3.3 Careful consideration shall be given to the placement of insulating devices.

3.4 Compression couplings, sleeves, and valves should be ordered with factory applied epoxy coating or equivalent. Couplings not previously coated, are to be wrapped with an approved material in order to protect the fitting and/or pipe.

3.5 Bolts on buried couplings, valves, and flanges shall be coated in the field to eliminate the possibility of corrosion. In all above ground installations these appurtenances shall be coated with an epoxy coating.

4.1 ANODES

4.2 Anodes shall be installed for cathodic protection of mains. The common sizes of anodes used for corrosion control are the 1# ingot, and cloth bagged

4.3 Anodes shall be installed with a minimum separation between other anodes by 3' and installed a minimum of 3' to the side of the main and 1' below.

4.4 Anodes may be installed perpendicular or parallel along the pipeline.

5.1 SURVEYS

5.2 New steel pipelines should have a cathodic protection system installed at the time of construction and shall be cathodically protected within 1 year of installation. A close interval survey not exceeding 5 feet may be completed to establish a baseline for cathodic protection potential measurements.

5.3 One-time pipe to soil potential readings on isolated fittings will be taken at the time of installation by field personnel and documented on the as built print.

5.3.1 Acceptable minimum pipe to soil potential reading (greater than 1.0 MV) must be obtained.

SECTION 35.00 CORROSION COATINGS

- References
- Pipe Coatings - General
- Tape/Wrapping
- Tape/Shrink Sleeves
- Ground Coatings

1.1 REFERENCES

1.2 NYCRR Public Safety Title 16 Part 255.461

1.3 American Society of Mechanical Engineering (ASME), Gas Transmission and Distribution Piping Systems, ASME B31.8 - 1999 Edition.

1.4 Department of Transportation (DOT), Part 192, 49 CFR, Subpart J, Requirements of Corrosion Control.

1.5 National Association of Corrosion Engineers (NACE).

2.1 PIPE COATINGS - GENERAL

2.2 Repairs and field coating during construction and maintenance is accomplished using approved hot and cold applied tapes, shrink sleeves, and paints.

3.1 TAPE/WRAPPING

3.2 Tapes and wrapping wherever applied is part of the pipe coating and is important part of the piping system's coating integrity. Tapes are effective only when applied properly, on clean, dry, primer coated pipe in accordance with manufacturers recommended procedures. All bare areas along a coated steel pipe including fittings, valves, and drips should be coated.

3.3 Cleaning and priming shall extend onto the existing pipe's coating (2 inch minimum overlap). This overlap shall ensure better overall corrosion protection.

3.4 Any time primer is used it shall be allowed to dry to a tacky condition before coating application (except in the application of wax tape primers).

3.5 Care should be used during the backfilling process as improperly placed or compacted backfill can create significant soil stresses that tend to pull off the applied coating.

3.6 Coating applications shall be over lapped 2-inch minimum onto existing undisturbed mill applied coatings.

3.7 Ensure the tape ends and edges are properly bonded and sealed to eliminate slippage of tape due to settlement.

3.7.1 Risers should be coated with Tapecoat H35 Grey Tape, or equivalent, no wax tapes shall be used.

3.7.2 Buried pipes should always be wrapped from the left side counterclockwise while

standing over the pipeline, final end taping shall be terminated in the 3 – 6 o' clock position to prohibit unwrapping caused by settlement

4.1 APPROVED TAPE/SHRINK SLEEVES

4.2 **Trenton #1 Wax Tape Buried Piping Only**
Color: Brown
Petroleum based wax tape 70-90 mils thickness
4" and 6" width

Vendor: McJunkin

This tape may be used on any below ground installation, but will perform most effectively when coating an irregular shaped component such as fittings, tees, flanges, or valves and anode connections. When used, **the pipe shall not be moved** after the wax tape is applied. The wax tape may lose its bond if the pipe is dragged or handled.

4.3 **Trenton #2A Wax Tape Above Grade Piping**
Color: Aluminum
Petroleum based wax tape 70-90 mils thickness
4" and 6" width

Vendor: McJunkin

This tape shall be used on above grade installations and may be used on below grade installations. It conforms well to any irregular shaped components such as valves and fittings and has ultraviolet inhibitors.

4.3 **Trenton Wax Primer**
Color: White
Petroleum wax, plasticizer, and corrosion inhibitor
Paste like substance applied by hand
1 gallon cans

Vendor: McJunkin

4.4 **Poly Ply Wrapper**
Clear plastic membrane used to provide mechanical protection against backfill stress when using wax tape products and Graycoat coating.
6" width

Vendor: Trenton

4.5 **Tapecoat 20**

Hot Applied Tape
Fabric saturated in coal tar pitch, 58 mils thickness
3, 4", and 6" width
Primer: Omniprime

Vendor: The Tapecoat Company

The preferred use of this tape is on below grade transmission mains.

4.6 **Tapecoat Grey H35**

Cold applied tape
Flexible polymer film and synthetic elastomeric
35 mils thickness
2", 4" and 6" width
Primer shall be used at temperatures below 40 deg. F (Omniprime)

Vendor: The Tapecoat Company

This tape may be used on any below grade installation. This product will be used instead of cold applied Royston Greenline Tape. The preferred use of this product is on welded joints on pipe less than and equal to 2 inches and repair of coating defects (holidays) on all pipe sizes.

4.7 **Graycoat Wax**

Wax Coating
No primer required
24" lb cans
Apply to 1/8" thickness
Poly Ply Wrap

Vendor: McJunkin

This wax may be used on any below ground installation. This will replace Roscote Mastic. The preferred use of this product is on fittings on 2 inch and larger pipe and on replacing coating through keyhole technologies. An additional use of Graycoat is for coating of bolts on buried couplings. Graycoat may be used in addition to any of the other field-applied coatings. Gray coat must always be used with Poly Ply wrapper.

4.8 **Shrink Sleeves**

Heat shrink application
LDPE/EVA Polyolefin sheeting
70% lateral strength
15 inches in length

Vendor: Canusa, Stuart Steel Corp., Umac

These products may be used below as well as above grade; their preferred use is on butt-welded joints greater than 2" in size during pipeline construction.

4.9 **J – Kits**
Epoxy coating
No primer required
Available in multi sized cans or drums

Vendor: Dura-Bond

A Manually applied liquid epoxy coating for coating weld joints on FBE, but primarily used on Powerecrete coated pipelines used for directional drilling applications. This product exhibits excellent cathodic disbondment resistance, adhesion to bare steel and mechanical properties.

5.1 ABOVE GROUND COATINGS

5.2 The preferred method of coating an above ground pipe installation is with an approved paint and primer combination that is specified for atmospheric corrosion resistance and good weathering properties.

5.3 **Sherwin Williams**
System 4000 Tile Clad, High Solids 2 Part A & B product.

This approved coating is a 2-package, epoxy polyamide high gloss coating for use in marine and industrial maintenance environments. The primer to be used is the Sherwin Williams Steel Recoatable epoxy primer. This product should be used for all large exterior meter sets, interior station piping, and bridge crossings.

SECTION 36.00 COATING INSPECTION

- Inspection
- References
- Inspection

1.1 COATING INSPECTION

1.2 This section describes the requirement to perform both a visual inspection of the coated steel pipe upon delivery and a visual or electrical coating inspection prior to installation.

1.3 The electrical inspection is not a specific code requirement but has been adopted as an acceptable construction practice to assure best possible coating integrity at the time of installation.

1.4 The electrical coating inspection is not required for tie in or short section replacements less than a length of pipe.

1.5 A Holiday Detector (Jeep) is used to perform the electrical coating inspection.

2.1 REFERENCES

2.2 NYCRR Public Safety Title 16 Part 255.461

2.3 American Society of Mechanical Engineering (ASME), Gas Transmission and Distribution Piping Systems, ASME B31.8 - 1999 Edition.

2.4 Department of Transportation (DOT), Part 192, 49 CFR, Subpart J, Requirements of Corrosion Control.

2.5 National Association of Corrosion Engineers (NACE).

3.1 INSPECTION

3.2 All pipe mill applied coating shall be inspected for defects (holidays) either visually or electrically. Visual inspection shall begin when the pipe is delivered. The coating shall be checked for damage during transit from the factory, and if excessive damage is observed, the pipe shall be rejected and returned to the supplier.

3.3 Visual inspection of the pipe shall be conducted from delivery to burial.

3.4 Coating may be damaged during transportation and handling.

3.5 All coated pipe shall be inspected visually and/or electrically either 1) prior to lowering the pipe into the ditch or 2) while in the ditch and prior to backfilling. Any identified damage to the coating which exposes the metal shall be repaired.

3.6 Electrical tests appropriate for the type of coating shall be used to detect defects in the coating which may not be revealed by a visual inspection. Where such tests are not practical, aboveground electrical tests, after installation, shall be conducted.

3.6.1 Electrical inspection prior to installation is conducted using a calibrated Holiday Detector also referred to as a Jeep. Each piece of pipe shall be tested above the trench using the Holiday Detector. The Holiday Detector shall be set to the required voltage necessary to effectively test the coating applied to the piping. If the manufacturer does not supply the voltage level for testing, the following formula from NACE RP-02-74 "High Voltage Electrical Inspection of Pipeline Coating Prior to Installation" may be used to acquire the required Holiday Detector setting:

Polyethylene Coating
Test Voltage=1250 x (Sq. Rt.) of T
T=coating thickness in mils

Fusion Bonded Epoxy Coating
Test Voltage=525 x (Sq. Rt.) of T
T=coating thickness in mils

NOTE: The thickness of "T" includes primer and coating combined.

- The Holiday Detector shall be grounded but when soil is dry or pipe is elevated, a direct connection to the pipe may be necessary. To check the Holiday Detector after the required voltage is set, first run the coil spring (electrode) over the coating and on to the bare cutback on either end of the pipe segment and notice the characteristic sound made when the coil spring contacts the bare pipe. Then make a small nick (holiday) in the coating. Run the coil spring over the area where the nick was created to see if the Holiday Detector would find it. If the Holiday Detector will not locate the nick, it must be sent out for repair and/or calibration, and another Holiday Detector shall be tested using the same procedure.

SECTION 37.00 CORROSION TEST STATIONS INSTALLATIONS

- Corrosion Test Stations
- References
- General
- Test Station Wires
- To Install Test Stations
- Test Station Installation Documentation

1.1 CORROSION TEST STATIONS

1.2 This section details the requirement to install corrosion control test stations, the specified wire size, color requirements, and typical test station diagrams to be followed for installation.

2.1 REFERENCES

2.2 NYCRR Public Safety Title 16 Part 255.469, 255.471

2.3 American Society of Mechanical Engineering (ASME), Gas Transmission and Distribution Piping Systems, ASME B31.8 - 1999 Edition.

2.4 Department of Transportation (DOT), Part 192, 49CFR, Subpart J, Requirements of Corrosion Control.

2.5 National Association of Corrosion Engineers (NACE).

3.1 GENERAL

3.2 All cathodically protected pipelines must have sufficient cathodic protection test stations necessary to obtain electrical measurements to determine adequacy of the cathodic protection.

3.3 Cathodic protection test stations may include: risers at meter sets and regulator stations, drips, above ground valves, above ground test station boxes and at grade boxes regulator vent lines.

3.4 Test stations should be installed in locations where they will not be damaged, and may be located near valve boxes, line markers, casing vents, pole lines, property lines, hedge rows, or fence lines.

4.1 TEST STATION WIRES

4.2 Test Station wire color-coding shall be followed to provide precise detailed information for new installations. The chart below details the type of test station installation, wire size and color-coding. Additional color combinations may be necessary to satisfy other installations

TEST STATION WIRE INFORMATION				
Wire Color	**Wire Size**	**Attach to**	**Test Station Type**	
Blue	12 AWG CU	Casing, Bare Pipe, Upstream Piping, & Foreign Facilities	2 WTS*	
White	12 AWG CU	Coated/Downstream Pipe	4WTS*	
Black	12 AWG CU	Anode Wire		
Yellow	12 AWG CU	Tracer Wire		

***** 2 WTS – 2 Wire Test Station

4.3 Test Stations already in service shall be upgraded as they are repaired or replaced.

4.4 Sufficient slack wire shall be provided to make connections and in case of future breakage. The wires should be looped around the buried gas facilities to relieve strain at test station and cad weld. The additional wire necessary for each test station is detailed below:

4.4.1 Flush Test Stations – allow additional 3 feet of wire above grade.

4.4.2 Above Grade Stations – allow additional 6 feet of wire above grade.

5.1 WHERE TO INSTALL TEST STATIONS

5.2 Across buried (and designated aboveground) insulated fittings on magnesium anode and rectifier protected pipelines.

5.3 Periodically along cathodically protected pipelines, such as highway crossings, water crossings, midpoint along right-of-ways, main offsets, or at any location where fieldwork removes an existing test station.

6.1 CORROSION TEST STATION INSTALLATION DOCUMENTATION

6.2 A record of installation must accompany each test station installation.

SECTION 38.00 CONVERSION FACTORS

1.0 CONVERSION FACTORS

1 CF Natural Gas = 1,000 BTU

1 Therm = 100,000 BTU = 1 CCF Natural Gas

1 MSCF Natural Gas = 10 CCF = 1,000 CFH = 1 DTH = 10 Therms = 1,000,000 BTU

1 KWH = 3,412 BTU = .03412 Therms = .003412 MSCF Natural Gas

1Gal. Propane = 91,600 BTU = .916 Therms = .0196 MSCF

Natural Gas 1 CF Propane = 2,500 BTU

1 Gal. #2 Fuel Oil = 139,000 BTU = 1.39 Therms = .139 MSCF Natural Gas

1 Gal. #6 Fuel Oil = 150,000 BTU = 1.5 Therms = .15 MSCF Natural Gas

1 BHP = 33,475 BTU/hr.
= 34.5 lbs. Steam/hr. (from and at 212º F)
= 139.5 sq. ft. EDR steam
= 223 sq. ft. EDR water

1 lb. steam from and at 212º F = 970 BTU

1 sq. ft. EDR steam = 240 BTU/hr.

1 Sq. ft. EDR water = 150 BTU/hr.

SECTION 39.00 SIZING TABLES

Pipe Sizing Tables

- For Pressures Less than 1 psig
- For 1 psig
- For 2 psig
- For 5 psig
- For 10 psig
- For 20 psig
- For 50 psig

1.1 PIPE SIZING TABLE

Pipe Size of Schedule 40 Standard Pipe (in.)	Internal Diameter (in.)	Total Equivalent Length of Pipe in Feet										
		50	100	150	200	250	300	400	500	1000	1500	2000
1.00	1.049	284	195	157	134	119	108	92	82	56	45	39
1.25	1.380	583	400	322	275	244	221	189	168	115	93	79
1.50	1.610	873	600	482	412	366	331	283	251	173	139	119
2.00	2.067	1681	1156	928	794	704	638	546	484	333	267	229
2.50	2.469	2680	1842	1479	1266	1122	1017	870	771	530	426	364
3.00	3.068	4738	3256	2615	2238	1983	1797	1538	1363	937	752	644
3.50	3.548	6937	4767	3828	3277	2904	2631	2252	1996	1372	1102	943
4.00	4.026	9663	6641	5333	4565	4046	3666	3137	2780	1911	1535	1313
5.00	5.047	17482	12015	9649	8258	7319	6632	5676	5030	3457	2776	2376
6.00	6.065	28308	19456	15624	13372	11851	10738	9190	8145	5598	4496	3848
8.00	7.981	58161	39974	32100	27474	24350	22062	18883	16735	11502	9237	7905
10.00	10.020	105636	72603	58303	49900	44225	40071	34296	30396	20891	16776	14358
12.00	11.938	167236	114940	92301	78998	70014	63438	54295	48120	33073	26559	22731

1.2 For Pressures Less than 1 psig

For pressures under one pound approximate capacity of pipes of different diameters and lengths in cubic feet per hour with pressure drop of 0.5 inch water column and 0.6 specific gravity.

1.3 For 1 psig

For 1 pound pressure capacity of pipes of different diameters and lengths in cubic feet per hour for an initial pressure of 1.0 psig with a 10% pressure drop and a gas of 0.6 specific gravity.

Pipe Size of Schedule 40 Standard Pipe (in.)	Internal Diameter (in.)	Total Equivalent Length of Pipe in Feet										
		50	100	150	200	250	300	400	500	1000	1500	2000
1.00	1.049	717	493	396	338	300	272	233	206	142	114	97
1.25	1.380	1471	1011	812	695	616	558	478	423	291	234	200
1.50	1.610	2204	1515	1217	1041	923	836	716	634	436	350	
2.00	2.067	4245	2918	2343	2005	1777	1610	1378	1222	840	674	577
2.50	2.469	6766	4651	3735	3196	2833	2567	2197	1947	1338	1075	920
3.00	3.068	11962	8221	6602	5650	5008	4538	3864	3442	2366	1900	1626
3.50	3.548	17514	12037	9666	8273	7332	6644	5686	5039	3464	2781	2381
4.00	4.026	24398	16769	13466	11525	10214	9255	7921	7020	4825	3875	3316
5.00	5.047	44140	30337	24362	20851	18479	16744	14330	12701	8729	7010	6000
6.00	6.065	71473	49123	39447	33762	29923	27112	23204	20566	14135	11351	9715
8.00	7.981	146849	100929	81049	69368	61479	55705	47676	42254	29041	23321	19960
10.00	10.020	266718	183314	147207	125990	111663	101175	86592	76745	52747	42357	36252
12.00	11.938	422248	290209	233048	199459	176777	160172	137087	121498	83505	67057	57392

1.4 For 2 psig

For 2 pound pressure capacity of pipes of different diameters and lengths in cubic feet per hour for an initial pressure of 2.0 psig with a 10% pressure drop and a gas of 0.6 specific gravity.

Pipe Size of Schedule 40 Standard Pipe (in.)	Internal Diameter (in.)	Total Equivalent Length of Pipe in Feet										
		50	100	150	200	250	300	400	500	1000	1500	2000
1.00	1.049	1112	764	614	525	466	422	361	320	220	177	151
1.25	1.380	2283	1569	1260	1079	956	866	741	657	452	363	310
1.50	1.610	3421	2351	1888	1616	1432	1298	1111	984	677	543	465
2.00	2.067	6589	4528	3636	3112	2758	2499	2139	1896	1303	1046	896
2.50	2.469	10501	7217	5796	4961	4396	3983	3409	3022	2077	1668	1427
3.00	3.068	18564	12759	10246	8769	7772	7042	6027	5342	3671	2948	2523
3.50	3.548	27181	18681	15002	12840	11379	10311	8825	7821	5375	4317	3694
4.00	4.026	37865	26025	20899	17887	15853	14364	12293	10895	7488	6013	5147
5.00	5.047	68504	47082	37809	32359	28680	25986	22240	19711	13547	10879	9311
6.00	6.065	110924	76237	61221	52397	46439	42077	36012	31917	21936	17616	15077
8.00	7.981	227906	156638	125786	107657	95414	86452	73992	65578	45071	36194	30977
10.00	10.020	413937	284497	228461	195533	173297	157020	134389	119106	81861	65737	56263
12.00	11.938	655315	450394	361682	309553	274351	248582	212754	188560	129596	104070	89071

1.5 For 5 psig

For 5 pound pressure capacity of pipes of different diameters and lengths in cubic feet per hour for an initial pressure of 5.0 psig with a 10% pressure drop and a gas of 0.6 specific gravity.

Pipe Size of Schedule 40 Standard Pipe (in.)	Internal Diameter (in.)	Total Equivalent Length of Pipe in Feet										
		50	100	150	200	250	300	400	500	1000	1500	2000
1.00	1.049	1989	1367	1098	940	833	755	646	572	393	316	270
1.25	1.380	4084	2807	2254	1929	1710	1549	1326	1175	808	649	555
1.50	1.610	6120	4206	3378	2891	2562	2321	1987	1761	1210	972	
2.00	2.067	11786	8101	6505	5567	4934	4471	3827	3391	2331	1872	1602
2.50	2.469	18785	12911	10368	8874	7865	7126	6099	5405	3715	2983	2553
3.00	3.068	33209	22824	18329	15687	13903	12597	10782	9556	6568	5274	4514
3.50	3.548	48623	33418	26836	22968	20356	18444	15786	13991	9616	7722	6609
4.00	4.026	67736	46555	37385	31997	28358	25694	21991	19490	13396	10757	9207
5.00	5.047	122544	84224	67635	57887	51304	46485	39785	35261	24235	19461	16656
6.00	6.065	198427	136378	109516	93732	83073	75270	64421	57095	39241	31512	26970
8.00	7.981	407692	280204	225014	192583	170683	154651	132361	117309	80626	64745	55414
10.00	10.020	740477	508926	408686	349782	310005	280887	240403	213065	146438	117595	100646
12.00	11.938	1172269	805694	647001	553749	490777	444680	380588	337309	231830	186168	159336

1.6 For 10 psig

For 10 pound pressures approximate capacity of pipes of different diameters and lengths in cubic feet per hour for an initial pressure of 10 psig with a 10% pressure drop and a gas of 0.6 specific gravity.

Pipe Size of Schedule 40 Standard Pipe (in.)	Internal Diameter (in.)	Total Equivalent Length of Pipe in Feet										
		50	100	150	200	250	300	400	500	1000	2000	3000
1.00	1.049	3259	2240	1798	1539	1364	1236	1058	938	644	517	443
1.25	1.380	6690	4598	3692	3160	2801	2538	2172	1925	1323	1062	909
1.50	1.610	10024	6889	5532	4735	4197	3802	3254	2884	1982	1592	1362
2.00	2.067	19305	13268	10655	9119	8082	7323	6268	5555	3818	3066	2624
2.50	2.469	30769	21148	16982	14535	12882	11672	9990	8854	6085	4886	4182
3.00	3.068	54395	37385	30022	25695	22773	20634	17660	15652	10757	8638	7393
3.50	3.548	79642	54737	43956	37621	33343	30211	25857	22916	15750	12648	10825
4.00	4.026	110948	76254	61235	52409	46449	42086	36020	31924	21941	17620	15080
5.00	5.047	200720	137954	110782	94815	84033	76140	65166	57755	39695	31876	27282
6.00	6.065	325013	223379	179382	153527	136068	123288	105518	93519	64275	51615	44176
8.00	7.981	667777	458959	368561	315440	279569	253310	216800	192146	132061	106050	90765
10.00	10.020	1212861	833593	669404	572924	507772	460078	393767	348988	239858	192614	164853
12.00	11.938	1920112	1319682	1059751	907010	803866	728361	623383	552493	379725	304933	260983

1.7 For 20 psig

Approximate capacity of pipes of different diameters and lengths in cubic feet per hour for an initial pressure of 20 psig with a 10% pressure drop and a gas of 0.6 specific gravity.

Pipe Size of Schedule 40 Standard Pipe (in.)	Internal Diameter (in.)	Total Equivalent Length of Pipe in Feet										
		50	100	150	200	250	300	400	500	1000	2000	3000
1.00	1.049	5674	3900	3132	2680	2375	2152	1842	1633	1122	901	771
1.25	1.380	11649	8006	6429	5503	4877	4419	3782	3352	2304	1850	1583
1.50	1.610	17454	11996	9633	8245	7307	6621	5667	5022	3452	2772	2372
2.00	2.067	33615	23103	18553	15879	14073	12751	10913	9672	6648	5338	4569
2.50	2.469	53577	36823	29570	25308	22430	20323	17934	15416	10595	8509	7282
3.00	3.068	94714	65097	52275	44741	39653	35928	30750	27253	18731	15042	12874
3.50	3.548	138676	95311	76538	65507	58058	52604	45023	39903	27425	22023	18849
4.00	4.026	193187	132777	106624	91257	80879	73282	62720	55538	38205	30680	26258
5.00	5.047	349503	240211	192898	165096	146322	132578	113470	100566	69118	55505	47505
6.00	6.065	565926	388958	312347	267329	236928	214674	183733	162840	111919	89875	76921
8.00	7.981	1162762	799160	641754	549258	486797	441074	377502	334573	229950	184658	158043
10.00	10.020	2111887	1451488	1165596	997600	884154	801108	685645	607674	417651	335388	287049
12.00	11.938	3343383	2297888	1845285	1579326	1399727	1268254	1085462	962025	661194	530962	454435

1.8 For 50 psig

For 50 pounds pressure approximate capacity of pipes of different diameters and lengths in cubic feet per hour for an initial pressure of 50 psig with a 10% pressure drop and a gas of 0.6 specific gravity.

Pipe Size of Schedule 40 Standard Pipe (in.)	Internal Diameter (in.)	Total Equivalent Length of Pipe in Feet										
		50	100	150	200	250	300	400	500	1000	2000	3000
1.00	1.049	12993	8930	7171	6138	5440	4929	4218	3739	2570	2063	1766
1.25	1.380	26676	18335	14723	12601	11168	10119	8661	7676	5276	4236	3626
1.50	1.610	39970	27471	22060	18881	16733	15162	12976	11501	7904	6348	5433
2.00	2.067	76977	52906	42845	36362	32227	29200	24991	22149	15223	12225	10463
2.50	2.469	122690	84324	67715	57955	51365	46540	39832	35303	24263	19484	16676
3.00	3.068	216893	149070	119708	102455	90804	82275	70417	62409	42893	34445	29480
3.50	3.548	317564	218260	175271	150009	132950	120463	103100	91376	62802	50432	43164
4.00	4.026	442393	304054	244166	208975	185211	167814	143627	127294	87849	70256	60130
5.00	5.047	800352	550077	441732	378065	335072	303600	259842	230293	158279	127104	108784
6.00	6.065	1295955	890703	715266	612175	542559	491598	420744	372898	256291	205810	176147
8.00	7.981	2662693	1830054	1469598	1257785	1114752	1010046	864469	766163	526579	422862	361915
10.00	10.020	4836161	3323866	2669182	2284474	2024687	1834514	1570106	1391556	956409	768030	657334
12.00	11.938	7656252	5262099	4225651	3616611	3205335	2904266	2485676	2203009	1514115	1215888	1040643

SECTION 40.00 STANDARD PIPE DATA

Standard Pipe Data

- Steel Pipe
- Plastic Pipe

1.1 STANDARD PIPE DATA

1.2 Steel Pipe

Nominal Size-Inches	Rating	Diameter O.D.	Diameter I.D.	Wall Thickness	Lgth Req'd 1 cu ft vol	Weight lbs. / ft.	Circumference OD
3/4	xh	1.050	0.742	0.1540	332.60	1.47	3.30
3/4	std	1.050	0.824	0.113	270.03	1.130	3.30
1	xh	1.315	0.957	0.1790	200.30	2.17	4.13
1	std	1.315	1.049	0.1330	166.60	1.68	4.13
1 1/4	std	1.660	1.380	0.1400	96.28	2.27	5.22
1 1/2	std	1.900	1.610	0.1450	70.73	2.72	5.97
2	std	2.375	2.067	0.1540	42.91	3.65	7.46
3	st	3.500	3.068	0.2160	19.48	7.58	11.00
4	tw	4.500	4.124	0.1880	10.76	8.64	14.14
4	std	4.500	4.026	0.2370	11.31	10.79	14.14
6	tw	6.625	6.187	0.2190	4.58	14.97	20.81
6	std	6.625	6.065	0.2800	4.98	18.97	20.81
8	tw	8.625	8.187	0.2190	2.73	22.36	27.10
8	sch-30	8.625	8.071	0.2770	2.81	24.70	27.10
8	std	8.625	7.981	0.3220	2.88	28.55	27.10
10	tw	10.750	10.310	0.2190	1.72	23.60	33.77
10	sch-30	10.750	10.190	0.2790	1.76	31.20	33.77
10	std	10.750	10.020	0.3650	1.83	40.48	33.77
12	tw	12.750	12.250	0.2500	1.22	33.38	40.06
12	std	12.750	12.000	0.3750	1.27	49.56	40.06
14	std	14.000	13.250	0.3750	1.04	54.57	43.98
16	tw	16.000	15.500	0.2500	0.76	42.05	43.98
16	std	16.000	15.250	0.3750	0.79	62.58	50.27

1.3 Plastic Pipe

1.3.1 PE3408 High Density (HDPE)

Nominal	Type	SDR	Diameter		Wall Thickness	Weight lb/ft	Coil Length	Stick Length
size-inches			OD	AVG ID				
1/2	cts	7	.625	0.439	0.090	0.07	500/1000	na
1	cts	9	1.125	0.875	0.125	0.170	500	na
1	cts	11	1.125	0.915	0.099	0.140	500	na
1 1/4	ips	11	1.660	1.358	0.155	0.310	500	na
2	ips	9	2.375	1.847	0.264	0.759	500	40
2	ips	11	2.375	1.943	0.216	0.640	500	40
3	ips	11	3.500	2.864	0.318	1.39	500	40
4	ips	9	4.500	3.500	0.500	2.724	500	40
4	ips	11.0	4.500	3.682	0.409	2.300	500	40
6	ips	9	6.625	5.153	0.736	5.903	500/1500	40
6	ips	11	6.625	5.421	.602	4.91	500/1500	40
6	ips	13.5	6.625	5.585	.491	4.130	500/1500	40
8	ips	9	8.625	6.709	0.958	10.00	500/1500	40
8	ips	11	8.625	7.057	.784	8.30	500/1500	40
8	ips	13.5	8.625	7.271	.639	7.00	500/1500	40

10	ips	11	10.750	8.679	.977	13.154	500	40

SECTION 41.00 CONTRACTOR INSPECTION GUIDE

- General Requirements
- Inspection Form

General Requirements:

Contractors may perform all functions required to safely construct and operate the Gas System according to the Gas Construction Standards and Gas Operating and Maintenance Procedures.

We must be responsible to ensure that contractors comply with Village and regulatory codes, standards and specifications. The inspector is an important part of this effort. While our primary means of ensuring compliance is hiring responsible contractors, 16 NYCRR Part 255 does require inspection of gas main construction at "sufficiently frequent intervals to assure the required quality of workmanship." To accomplish this, qualified Village inspectors will perform inspections of the contractor's crews to monitor compliance and document crew performance. However, the inspector's responsibility is more than just quality assurance; the inspectors also interact with customers, the community, and regulatory agencies. They also support the contractors to properly complete the job.

The intent of this section is to provide a guideline for Village personnel to follow when inspecting the construction of natural gas pipelines by contractors. The inspection requirements are based on the contents of the Village's Gas Construction Standards and Gas Operations and Maintenance Manual.

The basic responsibilities of all inspectors are:

- Randomly checking that the contractors work is satisfactorily performed to Village specifications and installed in accordance with contract documents.
- Documenting contractor performance.
- Authorizing and documenting minor field changes.
- Correcting drawings to "as-built" - this function is not only the responsibility of the inspector and may also be performed by the contractor. Plastic batch numbers shall be recorded on the as-built drawings. The inspector will record or verify that they have been recorded.
- Assuring while on site, compliance with Gas Construction Standards, Operating and Maintenance Procedures, Safety Rules and Regulations for contractors, and regulatory codes and rules.
- Documenting construction activities, labor and material usage.

- Acting as the Village representative to the contractors and the public.
- Advising appropriate Village supervisors of any problems that are beyond the inspector's authority or ability to resolve.
- Stopping contractors work for non-compliance; ordering repair or removal of any component not constructed in accordance with Village construction standards and the O&M manual.
- Assuring that the contractor is causing minimum inconvenience to the general public.

The inspector should review the construction drawings, contract specifications, and other pertinent documentation, and become familiar with the job before construction begins. Right-of-way, permit, environmental, and other routing restrictions should be noted on the drawings. One set of construction drawings should be designated as the "as-built" set, which will be used to document what was built and all deviations from the original layout. The contractor shall have a set of construction drawings and all pertinent specifications in possession at the job site at all times.

Copies of permits such as; highway, railroad, DEC, etc., should be at the job site for ready reference. The inspector may be required to have definite knowledge of roads to be bored, extent of bore, limitations of openings, roads that may be closed to traffic, authorities to be advised, etc.

When practical, the inspector should attend pre-construction meetings to develop an understanding of the details of the contract with the pipeline contractor, particularly as to the definition of the scope of work. If the inspector cannot attend the meeting, they should obtain details of the meeting from the attending Village representative.

The contractor will furnish the necessary labor, supervision, equipment and tools to perform the construction in a professional manner. The inspector should support their efforts, but is not on site to perform work for the contractor. If the contractor does not have the personnel or equipment to perform the work, the inspector should inform their supervisor.

The inspector may have to make decisions in the field and should prepare for such contingencies. The inspector should study the proposed construction drawings and confirm that contact has been made with representatives of other utilities whose facilities may be affected during construction activities.

The locations of proposed valves, drips, vents and other piping units which require above-ground components are to be checked to be certain that they will not be damaged by plowing (farm or snow) and mowing operations. Locating these units on property lines reduces the possibility of damage. The inspector shall

assure that the contractor has determined location of all other existing underground facilities, in accordance with 16 NYCRR Part 753. It is the responsibility of the contractor to contact the One-Call System (Dig Safely New York) to have them locate the sewer, water, gas, electric, and telephone or oil lines to ascertain exact location. The inspector should verify that this has been done prior to the contractors beginning work.

The pipeline is to be measured as it is installed and recorded on the "as-built' construction drawings. The location of the pipeline, relative to a permanent or semi-permanent structure, should be recorded on "as-built' drawings at close intervals to locate the pipe, particularly at all points of directional change. The inspector should also assure that the location of key fittings and appurtenances on the "as-built' drawings. On city streets or highways, the pipeline can be located relative to parallel curb, sidewalk, center of road, or property lines. All culverts, streams, underground utilities, or other permanent landmarks that may be crossed when installing the pipeline are to be indicated on the maps.

On large main and service projects where there is a group or batch of service installations, replacement or relocations, the inspector may be given the service orders and may be required to perform all customer contact, routing, and provide Engineering with the final as-builts including plastic batch numbers.

The public may ask the inspector various questions. In reply, the inspector should be brief and courteous and, if there is the slightest doubt about an answer, the inspector should offer to take the individual's name and telephone number and have someone contact them.

The inspector may be required to verify the identity of contractor's personnel performing covered work to assure he/she is participating in the contractors' drug testing program. Covered work is performing construction, operation, maintenance, or emergency response functions on pipelines containing gas. Verification can be performed by the Village's Supervision prior to the commencement of work, as well as randomly during the work construction. Contract employees are to provide personal identification such as a driver's license, or other photo ID, to verify identity initially. Any employee unable to provide proof of identity shall not perform covered work until proper identification is furnished.

The "Village of Hamilton Municipal Gas Daily Inspection Report" (copy at end of document) shall be completed daily by the inspector and/or the contractor, documenting the amount of work completed. If, for whatever reason, the Contractor does no work on a normally scheduled workday, the inspector should complete these inspection forms for Village records, indicating that no work was completed.

While on the site, it is the responsibility of the inspector to check that the

contractors work performance is in conformance with the Village's General Contract specifications, applicable Gas Construction Standards and Procedures, and all other applicable requirements. It is always the responsibility of the Contractor to assure that all work complies with the above referenced standards, and their failure to do so will result in the termination of the job-specific contract and may also preclude consideration for future work.

While on site, the inspector is responsible for compliance with OSHA standards and work site safety requirements specifically for the protection of other Village employees who may be on site. The Contractor is responsible for compliance with OSHA standards and work site safety requirements specifically for the protection of their employees and the general public. However, if the inspector has knowledge of, or should ("with the exercise of due diligence") have knowledge of, a hazard and/or non-compliance with OSHA standards, the inspector must take appropriate action to assure that the hazard is abated.

Documentation of the Contractor's performance, both good and bad, is an important part of the inspector's responsibilities. The inspector should provide input to their supervisor regarding their observations of the work performed.

Refer to next sheet for Inspection Form:

Village of Hamilton Municipal Gas

Daily Inspection Report

Work location: _____ **Date:** _____

Contractor: _____ **Foreman:** _____

PE Fuser: _____ **Welder:** _____

Village Inspector: _____

Start Time: _____ **Quit Time:** _____

Gas Main Installed:

Size:			
Length:			

From: _____ **To:** _____

Material: **Steel:** _____ **PE:** _____

PE Batch # and SDR: _____

Gas Services Installed:

Number	Size	Length

Other Equipment Installed: _____

_____

_____

_____

_____

Page 1

Village of Hamilton Municipal Gas

Daily Inspection Report

Remarks and Comments: discuss safety issues, delays, equipment issues, installation problems, extra work, property owner or customer issues.

Page 2